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The Marine Engineer.

LONDON, APRIL 1, 1897.

WITH strikes looming in front of the engineering trades again, and affecting our own branch of the industry more particularly, it cannot be wondered if masters are led to consider every possible opening for labour-saving tools to endeavour to get over the labour difficulty and keep their trade together. That the present trouble is over this very question only emphasises the matter the more strongly, because determination on the employers' part is certain in the long run to carry the day. Whether it is a new adaptation of electric power which has recently been before the public so much for shop use, or whether it is a special tool actually showing more economical results on the day's working, the final issue must be the same. And without desiring to enteri nto the merits of the present dispute, because it is *sub judice*, it is very much to be regretted that, with the competition going on all over the world for marine work, some form of arbitration cannot adjust matters so that the men may be educated to see that improvements in manipulation are not by any means disastrous to their best interests. It is obvious that if every advantage is not taken by the heads of departments to keep expenses down, labour will be gradually ousted to the benefit of the foreigner, and then, when it is too late masters and men both will be out in the cold. We admit that new introductions sometimes press hardly on individuals. When has this not been the case since the first steam engine was invented? Yet, who will say we are not all better off for these novelties, that have followed on since, and are now legion, not even to be counted? They are, in fact, the very life and soul of trade. Without them, commercial interests would quickly die. Again, if one field closes more open in proportion. A fact not clearly recognized by the men's organizations is that too much stress should not be made on confining a man to one particular branch of work. The system should be more flexible, and thus be advantageous to the organization itself. We need not enter into details because they are patent to everyone familiar with shop working, but if there were more freedom in the conditions binding the employees together for their mutual aid, no one need be inconvenienced by more modern modes of working, because the rules would meet the case. As it is now, these organizations are so complex and hedged in with regulations that neither the men who belong to them, nor the masters—the dominant factor—can move. This is not at all as it should be, and it makes us ask ourselves whether, while preserving the societies as they are, the code controlling them may not be relaxed. Why, for example, should a lad trained in one department not be eligible for employment in another, if deemed competent later on in life. Then a great many of these struggles that are uppermost from time to time, would be found to dwindle down into very small proportions, and the disruption to trade not take place. We may be sure of one thing that our neighbours are for ever on the alert to step in where they find a weakness in our armour, and it therefore behoves men and masters to stand well together.

THE lamentable recurrence of accidents to fine vessels when in port or still water by turning turtle through loss of stabillty such as happened to the s.s. *Orotava* in the Tilbury Dock, would imply that the necessary functions and conditions of stability in floating bodies is too little known and understood by certificated officers in charge of the vessels. The Board of Trade enquiry in the above case would appear to confirmthis and we are therefore glad to see that the Shipmasters' Society has done what is in its power to remedy any such want of knowledge by a paper read to its members on "Elementary Stability," contributed by Lieutenant Anthony S. Thomson, R.N.R., a younger brother of Trinity House. The elementary principles are very well and clearly put by this author in such a way as can be readily grasped by the least scientific auditor. For instance, he forcibly points out the main distinction between the stability of solidly supported and floating bodies. In the first case the stability depends upon the movement of the centre of gravity relatively to a fixed and definite point of support or base, and stability constantly reduces by the angular disturbance of the body until it disappears, as the vertical through the centre of gravity passes outside the base, when instability and fall by gravity ensues. In the floating body the preliminary conditions are very similar. The centre of gravity is above the actual point of water surface support and the centre of the pressure of buoyancy may be considered the actual line of support which, when the vessel is vertical, passes upwards through the keel. But immediately the vessel commences to heel, the analogy of the circumstances alters, for in the floating body the centre of buoyancy travels also outwards towards the direction of the heel or else no vessel would be stable. The travel outwards of the centre of buoyancy depends upon the outward form of the hull and its tendency to displace water on the beam for any given heel of the vessel, and the distance that the centre of buoyancy moves out on either side of the centre of gravity for a given angle of heel may be compared to the length of a variable and extensible

rigid base of support outside which the vertical through the centre of gravity may not fall if stability is to be retained. Owing to the variation in the height of the centre of gravity due to loading or want of loading or ballast and the variable position or travel outwards of the centre of buoyancy due to the special build of any vessel, the stability may not be always reliable up to certain presupposed maximum angles of heel, but may tend to disappear at small angles where the centre of gravity is exceptionally high for want of freight or ballast, even though it might re-appear again at greater angles, or would be perfectly safe when the vessel is normally loaded or ballasted. It would be thus of great importance that each shipmaster and his executive staff should know whether there were any tender angle of heel, when the vessel was light, as it would be by such an unforeseen occurrence that such accidents as that to the *Orotava* might arise. The only and natural position of a vessel at rest upon a liquid, whether standing upright, or with a permanent list, is when the verticals through the centre of gravity and the centre of buoyancy coincide. When they are not so situate the equal and opposite forces form a couple which has a tendency either to right the vessel or to turn it over. The intersection of the upward line of buoyancy with the original vertical line through the centre of gravity and the keel is termed the meta-centre and the height of this meta-centre above the actual centre of gravity is one form of measurement of the stability of the vessel. Hence the rise of the centre of gravity by want of loading, badly arranged cargo, or want of ballast, tends to cause the meta-centric height when heeling to disappear, and the vessel to pass the limit stability which occurs when the meta-centre coincides with the centre of gravity. All these points are fully gone into with diagrams and formulæ in the above-mentioned paper, and form most interesting reading to anyone desirous of becoming more intimately acquainted with the phenomena of stability, or the want of it. We do not, however, see a suggestion of a very simple way in which the relative lines of buoyancy and gravity in any hull may be experimentally ascertained by anyone. If a series of sections through any hull be made and cut out of cardboard, the centre of gravity of the whole of such sections pasted together on one central axis may be readily ascertained by experiment, by finding round which point the united cards perfectly balance on a needle point. Of course, such sections would represent a hull of perfectly uniform distribution of weight throughout its hull, but by patches or removal of central part of the sections, the condition of any relative loading might be imitated. To ascertain experimentally the centre of buoyancy for any angle of heel, that centre is absolutely the centre of gravity of the displaced water, and if sections of cardboard, representing the various sections through the immersed portion of the hull in any position of heel, were taken and formed together on a common axis, the centre of gravity or of balance of such aggregated sections could be easily found, and a line perpendicular to the upper level of the immersed section and passing through such centre of gravity would be a graphic representation of the line of the pressure of buoyancy of the displaced water.

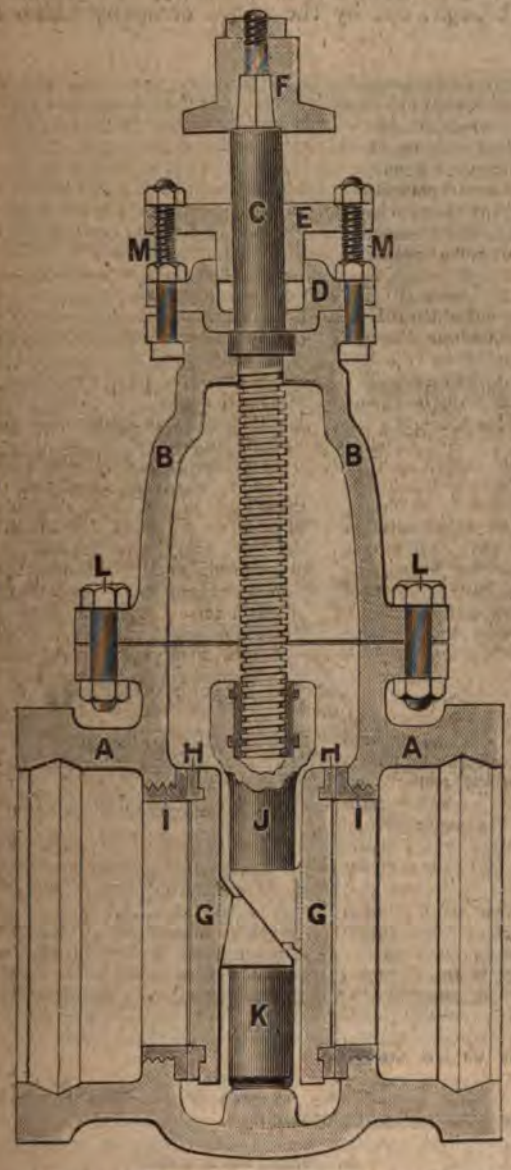
THE LUDLOW VALVE.

IT is a pleasure to be able to bring to our readers' notice something in the way of valves that will repay their attention, both from a practical and scientific point of view. The main cuts we present show the

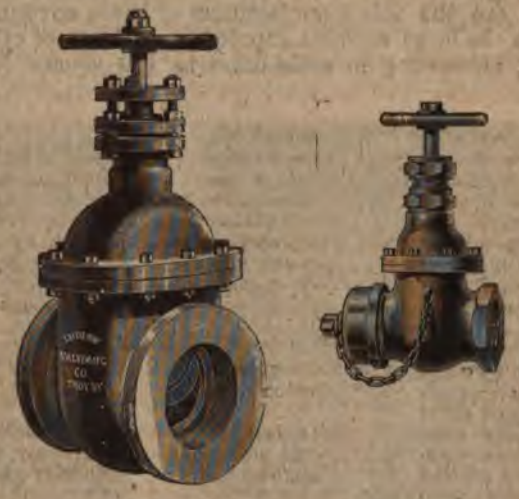
external appearance, the parts of the valve ready for fitting together, and a full section of the valve and case in position. These valves are made in all sizes and for all pressures, and their construction is such that an absolute full way opening is given to whatever is passing through the pipe to which the valve is attached. Following the lettering, G G represent the gates, and these gates are parallel to each other with a distance from the seats during the rise and fall of from 3-64th to $\frac{3}{4}$ of an inch, according to size. When screwed down the two wedges on these gates cause them to come hard on the seats, while K finds its position on the boss cast at the bottom of the body. This is done by turning the nut F. The opposite follows when this operation is reversed to open the valve, the top wedge is released from its seat on the bottom one, and all friction being relieved between the gates and their seats, the former fall inwards, and are free to lift.

The Ludlow Valve Manufacturing Co., 96, Leadenhall Street, owning these patents, claims there is less wear and tear on the faces of the gates and seats than in any other similar type of valve, and we should say this would be borne out in practice. There are

reasons for the superiority which may not at first sight be apparent, the wedges are independent of the gates, and working between them make it impossible for them to stick fast. As the lower wedge first comes in contact with the boss in the bottom of the case and then stops, directly the top wedge gets into position, its action is to move the gates horizontally. There is no sliding into place, but they are forced squarely



against their seats. In opening, the first turn of the tem relieves the upper wedge, instantly releasing he gates, and before they commence to rise, which is claimed not to be accomplished in any other make of valve. It will be noticed that this system will work equally with pressure on either gate, that is to say, the suction and delivery sides of the valve are interchangeble at will, which in some cases may be important. Another point worthy of mention too, is that water cannot get near the working parts, and if, therefore, a severe frost comes on, the action is unimpeded. We are informed these valves are largely used in the U.S. Navy and Mercantile Marine. For deck and fire purposes we show a small valve suited for this particular work. The mechanism of these valves is identical; the only difference being the stuffing-box is screwed (M) instead of bolted, and are furnished



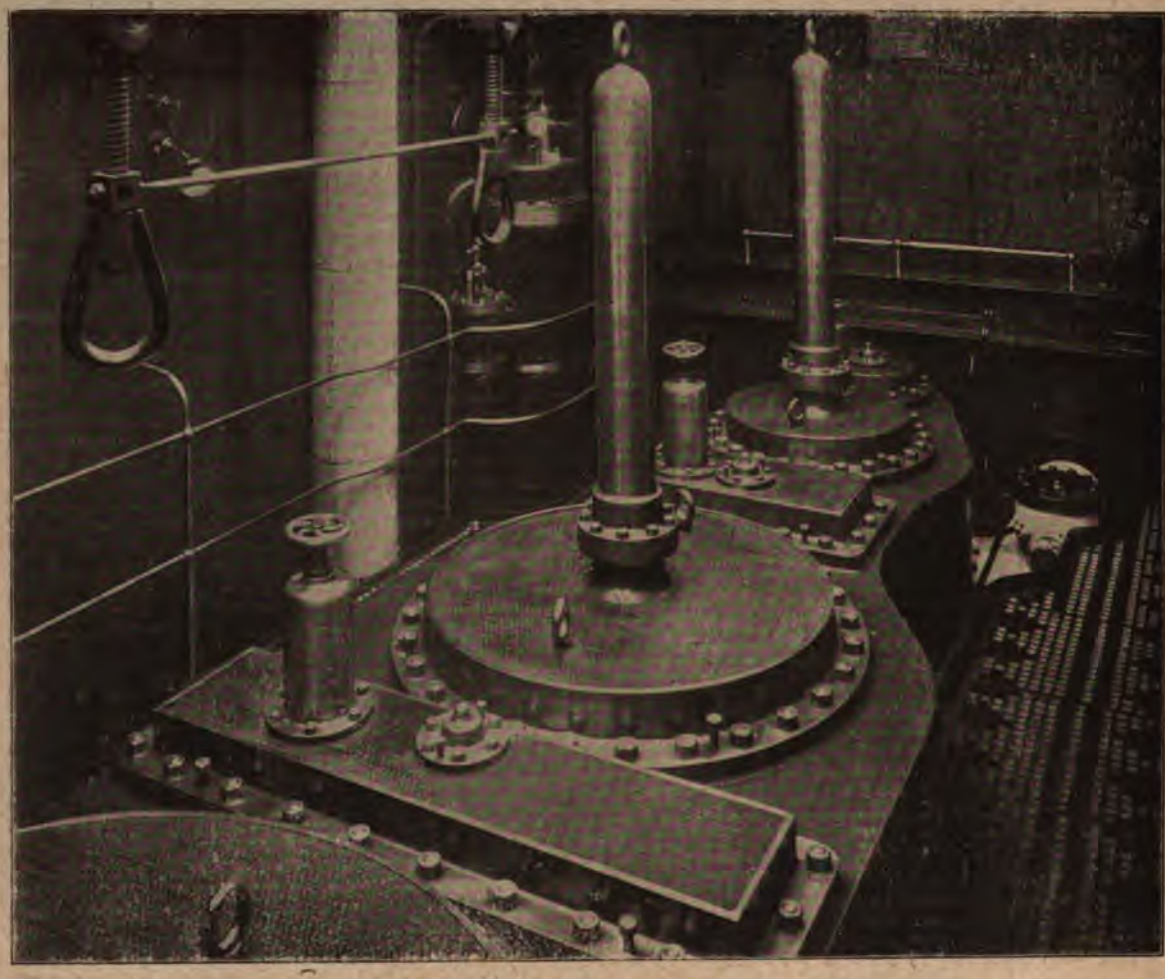
either with cap and chain or loose coupling. On the smaller sizes the cover is screwed (L) to case. In our lettered diagram, A is the case, B cover, C stem, D stuffing-box, E gland, F stem nut, G gates, H gate ring, I case ring, J top wedge, K bottom wedge, L bolts for holding case to cover, and M stuffing-box bolts, and thus rendering any further explanation unnecessary.

BLUE ASBESTOS.

WE had the pleasure of referring to this valuable speciality in our last year's April number as an article that had been found to possess great non-conducting properties. We then showed also, that it was lighter, and also considerably stronger when made into wool, than that obtained from other asbestos, Following on these valuable properties a variety of purposes presented itself hitherto not anticipated from this useful mineral. Being higher and more flexible for refractory purposes, we noticed that it had been largely used for covering marine boilers in the form of asbestos mattresses or blankets stitched together, and the space between filled with pure asbestos fibre. Adopted almost exclusively in the French and Italian Navies for this purpose, the convenience is apparent, as it may easily be removed and replaced to examine and repair the boiler. For the undersides of boilers, where it is practically impossible to put on cement lagging, the utility is even more clear; but now, in addition, besides boilers and pipes, where it has been hitherto extensively applied, there has recently been a new departure for covering the tops of cylinders with these blue asbestos mattresses, for which provisional protection is granted. This consists in fitting parts of the covering together by hooks and eyes, and to take any shape, so that these parts may be readily connected and separated. If, for example, inspection

is desirable of a valve case or other detail of the cylinders, here is the opportunity.

Our illustrations show this system as fitted to the tops of cylinders of the *Knight of St. George*, a vessel of 6,400 tons, belonging to the Knight Line of steam ships running from Liverpool. This work was executed by the Cape Asbestos Co., Limited, of 8, Minories, E.C., who are the sole manufacturers of these coverings. With the large surfaces exposed on the tops of cylinders, amounting in some cases to 150 square feet, other warships have applied the coverings is, however, a measure of the success which the system has attained, and sufficiently striking we venture to think. There is evidence already to hand, however, which shows that the covering saves its cost within a very short time, and if condensation is saved in the cylinders by its adoption and possible knock thereby prevented, we may be pretty sure as to the economy resulting. We have before us a copy of a new circular just brought out by the above company which gives some very interesting details as to the efficiency of these blue asbestos coverings.



Cylinder Tops of the "Knight of St. George."

there must be obviously a great loss of heat by radiation, and it is with a view to prevent this loss that this innovation has come about. If the heat in engine-rooms may be thus reduced it will be a considerable gain to the staff, and the success has been such that already several steamers of large size have adopted it. At the present time careful tests are being made to show what the actual saving of coal made really is from the use of these coverings, and we may probably refer again at no distant date to the matter. That our own Navy, which only recently placed an important order for the coverings with these mattresses for a further ten torpedo destroyers, together with the French, German, Italian, Spanish, Greek, Argentine, Japanese, Chilian, and

S.S. "AORANGI."

THIS vessel was built by Messrs. John Elder & Co. some thirteen years ago, and was, up to a few months ago, in service under the flag of the New Zealand Shipping Co., Limited, when it was decided to entirely refit her and place her with the *Miowera* and *Warrimoo* on the Canadian-Australian Royal Mail service. The machinery is the production of Messrs. The Wallsend Shipway and Engineering Co., Limited, and we have here a magnificent tribute to the capabilities of that well-known firm. From the date of placing the order until the vessel proceeded on her trial trip, a period of just six months elapsed, and it will be acknowledged by all who are in a position

to judge, that, considering the dimensions of the engines and boilers, this constitutes a remarkable performance.

The old compound engines and boilers have been entirely replaced by modern triple-expansion engines and high-pressure boilers of the latest and most approved design. The dimensions of the cylinders are 32 in., 51 in., and 86 in., with a stroke of 54 in. The engines are of very massive design, all parts being of extra strength, and the wearing surfaces extra large to meet the special requirements of the trade in which the vessel is intended to run, and to reduce to a minimum the risk of a breakdown.

A special feature in connection with the slide valve gear is two of Joy's assistant cylinders, which are fitted to the intermediate and low-pressure slide-valves in order to relieve the weight upon the eccentrics. They take the place of the ordinary balance piston usually fitted. Diagrams were taken from these cylinders on the trial trip, which amply prove the efficiency of this important fitting.

Steam is supplied from four single ended boilers 15 ft. 6 in diameter by 12 ft. long, having a working pressure of 180 lbs. They are fitted with Howden's forced draught arrangement, the air being supplied to the furnaces by a large fan driven by two independent engines.

In the engine-room a very complete installation of auxiliary machinery has been fitted. The main feed pumps are of Messrs. G. & J. Weir's well-known automatic type, the feed pumps on the main engines having been dispensed with. Working in conjunction with the feed pumps is a feed heater by the same makers.

The circulating pump is of the centrifugal type, made by Messrs. Drysdale & Co., of Glasgow, and is driven by two independent engines, each engine being capable of doing the work, so that one is kept as a stand-by in case of need.

A special feature in the engine-room is a large Wotherspoon & Davis evaporator capable of making 40 tons of fresh water per 24 hours, this large quantity being necessary owing to the long runs between calling ports, necessitating an ample provision for making fresh water for the boilers. There is also fitteda double feed-water filter of Messrs. Wotherspoon & Davis's make. It is constructed in duplicate, so that one part of the filter can be cleaned while the feed water is passing through the other.

A See's ash ejector for discharging ashes is placed in the stokehole, and is worked by means of a special vertical duplex pump placed in the engine-room.

Blue Asbestos as Fitted to the Tops of Cylinders of the "Knight of St. George."

The propeller is fitted with blades of manganese bronze.

The engines on trial trip developed 4,950 H.P. when running at 83 revolutions, and worked without a hitch during the whole trial, and also on the passage from the Tyne to the Thames.

Indicator diagrams were also taken from the Weir's feed pump and the centrifugal circulating pump. When the main engines were developing their maximum power these diagrams showed an I.H.P. for the feed pump of 25, and for the centrifugal circulating pump of 20.

Besides supplying the new machinery, the whole of the shipwork between the engine and boiler-room bulkheads in connection with the exchange of machinery, shifting of bulkhead, renewing and rearranging the bunkers, preparing the new seats for the new engines and boilers, &c., was carried out by the ship repairing department of the engine builder's works, which constitutes an important branch of their business.

INSTITUTE OF MARINE ENGINEERS.

ANNUAL MEETING.

THE annual meeting of the Institute of Marine Engineers was held on March 12th at the Institute premises, 58, Romford Road, Stratford. Mr. Alderman Kidd (vice-president) occupied the chair.

The hon. secretary (Mr. James Adamson) read the eighth annual report of the Council, which stated *inter alia* that the session 1896-7, which closed on January 31st, had been progressive in respect to the increasing membership and to the increased facilities given to the junior section, while the papers and discussions had been full of interest and value, and the social events in connection with the Institute had been well up to the standard of former years, at least. The membership at the close of the financial year stood at 1,031, made up as follows:—783 members, 84 associate, 75 associates, 65 graduates, and 24 companions, showing, as compared with the previous year, an increase of 113. Since the last report the loss of 13 members by death had unhappily to be recorded. Seven papers, besides lectures and special subjects, had been read and discussed. Members who had papers in preparation were desired to communicate with the convener as soon as possible to admit of a syllabus being arranged and printed well in advance, thus adding to the convenience of all concerned. The contributions from sea-going members were not so numerous as in former years. It would be of great interest in their "Transactions" to have the majority of the papers by sea-going members, and on subjects with which they were familiar; such papers should be distinctive of the Institute. Interesting papers might be written on the comparison of sister vessels—of similar engines in different ships, and other combinations in different circumstances; the behaviour of engines, ships, and propellers in all weathers and under different management. These and many other subjects, and also original suggestions, plans and arrangements, were suggested for consideration. The drawing classes had been carried on during the session, on Tuesdays and Thursdays, by Mr. W. J. Nowers Brett; lectures had been delivered on occasional Tuesday evenings, and in order to preserve these for the general benefit, several friends had given donations to form a special fund for publishing reports in connection with the Graduate section, to avoid encroaching on the general funds of the Institute. A deputation from the Council had an interview with the Technical Instruction Committee of West Ham in December, when the claims of engineering and naval architecture were urged upon their attention with the object of obtaining the best possible recognition of the higher scientific education being placed within the reach of young engineers in the Technical College about to be erected in Stratford. Recommendations made to the Board of Trade three years ago, on the subject of the minimum qualifications necessary for engineers of the Mercantile Marine, had not yet been actually adopted and passed into law, but it was hoped that, in the interests of the whole community, the points especially recommended would soon be put into force. There were indications that the President of the Board of Trade was dealing with the question, and they might look forward to the publication of a Bill shortly which would include the following points:—Minimum service in the workshop of five years; the introduction of a third-class certificate; the necessity of defining the meaning of N.H.P.; and the recognition of the engineers as officers of the ship, and as such the representation of the engine department on inquiries affecting that department. The Colonial Parliaments had had under consideration the subject of N.H.P., qualification of engineers, and other matters, and the results had been in many respects satisfactory, although they might not agree with all the terms of the Bills passed for the Colonies. It was gratifying to observe that the subject of the engineers of the Royal Naval Reserve was being dealt with in the Naval Estimates. The President of the Institute and others interested in the subject were to be congratulated on the fact that their efforts had so far met with recognition. The appointment of a representative engineer on the Board of Admiralty appeared to be most desirable. It was a matter of congratulation to the Institute and the country that the Director of Naval Construction had been restored to health and duty, and it was proposed that Sir William H. White should be elected a life member.

The annual report of the Bristol Channel Centre having also been read,

Mr. Robert Leslie, the honorary treasurer, presented the financial statement for the year ended January 31st, 1897, which on the whole showed, he said, a healthy state of affairs. He might add, however, that since January 31st the final notices which had been issued to the defaulting members had brought in a considerable amount of arrears, so that the Institute now stood in a very much better position than it did some months ago.

Mr. John Blake proposed the adoption of the annual reports and statement of accounts, and said he thought that members of the Institute had every reason to be satisfied with the report presented by the Council. It furnished very full information as to the work of the Institute during the past year, and the balance-sheet, which, by the way, had been audited and signed by a firm of chartered accountants, would also, he thought, be deemed very satisfactory. The members of this Institute, unlike the members of some kindred societies, were distributed over a very large area, and he was glad to find that the annual report had been drawn up so fully and with such care, because their fellow members at home and abroad would read with much satisfaction the particulars given of the valuable and useful work that was being done by the Institute.

Mr. J. E. Elmslie seconded the motion and expressed himself especially pleased at the proposition to elect Sir William White a life-member of the Institute.

The motion was unanimously adopted.

Professor Elliot then proposed a hearty vote of thanks to Sir Edwyn Dawes, the retiring President, for his services during the past year. The record of their retiring President's term of office had perhaps been, to a certain extent, uneventful, but it had been marked by sound and sure progress. The Institute had elected as its presidents men, who although not engineers, had been distinguished in connection with the development of the marine policy of this country, and looking back at the close of Sir Edwyn Dawes's presidency, he thought they would be all agreed that that course had been fully justified. Sir Edwyn Dawes had on many occasions played an important part in the development of the marine policy of the Mercantile Marine, and he had shown that it was not necessary to be a professional politician in order to give expression to a sound judgment on national or colonial affairs as they were affected by the development of the Mercantile Marine. There was no doubt that the country at large did not appreciate the extent to which it was indebted for its advance and defence to the Mercantile Marine and those connected with it; and having regard to the indebtedness of the country to our merchant navy for its food supplies, the importance of this matter might be brought home to the inhabitants of these islands in the event of war in a terrible fashion. Sir Edwyn Dawes had brought the shipowners into closer touch with the marine engineers, the interests of the two being identical. He had much pleasure in proposing this vote of thanks, and while wishing their late President long life and prosperity, they would venture to remind him that he would still be a past President of the Institute, and they would always be glad to welcome his kindly co-operation in the years to come.

Mr. Caird seconded the motion, which was carried with acclamation, and the hon. secretary read the following letter, which he had just received from Sir Edwyn Dawes:—

"23, Great Winchester Street, E.C., March 10th, 1897.

"Dear Mr. Adamson,—I believe my term of office, as President of the Institute of Marine Engineers, expires this month, and I cannot allow the occasion to pass without expressing my sincere thanks for the very hearty support I have received from the Council, Mr. Taylor in the social events, and yourself in the performance of the very pleasant duties which have devolved upon me. I had some misgivings when accepting the invitation, but it has been a great pleasure to me to do what little I could to advance the interests of the institution, which is fulfilling a most useful and indeed a national work. I shall always take a warm interest in the proceedings of the Institute, and heartily wish it continued success.—Yours truly (signed), EDWYN S. DAWES."

Mr. T. F. Aukland, in proposing a vote of thanks to the office bearers and Council, said the reports which had been presented that evening denoted progress and good work of a very marked kind, and this work certainly merited acknowledgment at the hands of the general body of members. Reference was made in the report to the question of engineers in the Royal Naval Reserve, and that question was a most important one, because in the event of war breaking out we certainly should not lack ships but we should lack men. Engineers in the Royal Naval Reserve should, therefore, have

the opportunity of working on board her Majesty's vessels, so that in times of emergency they would be able to do their duty in such a way as to be of the best service to their country.

Mr. J. G. Hawthorn seconded the motion, and said he could speak from personal experience with regard to work done by the members of the Council, for in the early history of the Institute he had the honour of working on the Council for three successive years. He knew the number of hours that were devoted by the Council to the work of the Institute, and the earnest and hearty good fellowship with which all had worked together, having only one object in view—to carry out that which was best in the interests of the Institute. Engineers were a migratory race, and it was therefore essential that there should be the fullest confidence in their office bearers. Some members did not get to the Institute once in 12 months, and the confidence, which was shown in those entrusted with the management led every member of Council to take special care that everything was carried out in a regular and proper manner.

The proposal was carried unanimously, and Mr. J. H. Thomson, the chairman of the Council, briefly acknowledged the vote. A vote of thanks to the auditors, proposed by Mr. F. Cooper and seconded by Mr. H. C. Wilson, was at once agreed to, as was also a similar compliment to the hon. solicitor, proposed by Mr. Leslie and seconded by Mr. Sage.

Mr. John Adamson, the convener of the Educational Committee, in the course of some remarks on the work of the Institute in regard to technical education, said:—You will have noticed that with the consent of the Council, who, I am pleased to say, were always unanimous, we made a slight departure in the engineering and drawing classes. We opened the session 1896-7 with a social evening for members and their friends, and, as you may be aware, it was a complete success. We doubled the number of students, who, under the tuition of Mr. Brett, have made good progress. I felt that the educational department should be brought into the foreground and not left in the background, and to this end we introduced lectures on occasional Tuesday evenings, which were apparently much appreciated by the students; and I would here take the opportunity of thanking those gentlemen for helping me with their lectures in making this session a success, and of real educational value. We intend in the session 1897-8 to continue those lectures, and, if possible, to begin mathematical classes, but we are hampered for money. The funds of the Institute, for a very good reason, are not available for this purpose, and I would appeal to individual members to help us to carry on our educational work in a manner befitting this great institution. I look upon the graduates with very much the same eyes as a church looks upon its Sunday-school scholars. Their associations with this Institute are formed when young, and they never forget it, and they will become the backbone of it when we are no longer able to carry it on. We ought to encourage the young to join, and also make the Institute pleasant, and there is no better way of doing this than by making it an educational centre in fact as well as in name. Gentlemen, the Technical Institute which the council of West Ham are wisely building, and which, I am sure, has the sympathy of this institution, will fill a much-needed want in this large and growing community. I trust the Technical Committee will see that it fulfils the high purpose for which it is built, and to do this they must aim at a high standard of education. No rudimentary curriculum will suffice. They must not forget that in this district there are many engineering and other establishments where monster ironclads are built for this and other Governments, where engineering and chemical science are an everyday practice, and which have helped so largely to build up this great Empire. If this supremacy is to be continued they must educate the rising generation to a high standard, and I hope the day may not be far distant when engineers may be turned out of it—the proposed institute—for the Navy and the other branches of her Majesty's service where engineering science is required. I am sure that if the Technical Committee aim at this high standard of education the Institute of Marine Engineers will do its utmost to help them in their efforts.

The scrutineers reported that the ballot for the office bearers and Council for the ensuing year had resulted in the election of the following:—President, Mr. J. Fortescue Flannery, M.P.; hon. treasurer, Mr. R. Leslie; hon. secretary, Mr. James Adamson; members of Council, Mr. J. Bigmore, Mr. A. Blair, Mr. J. Bulloch, Mr. A. Campbell, Mr. J. Richardson, Mr. F. W. Shorey, Mr. J. T. Smith, and Mr. J. H. Thomson; hon. minute secretary, Mr. C. H. Newby.

It was also reported that the Bristol Channel Centre had elected the following:—President: Professor A. C. Elliot; vice-presidents: Mr. David Gibson, Mr. T. W. Wailes and Mr. J. F. Walliker; representative to Council: Mr. M. W. Aisbitt; hon. treasurer: Mr. A. E. Smithson; hon. sec.: Mr. George Sloggett; committee: Mr. J. Chellew, Mr. T. A. Reed, Mr. W. Scott, Mr. W. Simpson, Mr. H. G. Symonds, and Mr. R. Williamson.

Mr. F. Shorey informed the meeting that a deputation from the Council of the Institute had waited upon the committee connected with the new Technical Institute for West Ham, when the views of this Institute on the subject were very clearly explained by Mr. Fortescue Flannery, M.P., and from the kindly spirit in which the deputation was received he thought the interview would lead to some good results.

At the instance of Mr. W. C. Roberts a hearty vote of thanks to the chairman for presiding was passed with cheers, and

Mr. Alderman Kidd, in acknowledging the vote, said he was always prepared to do what he could to serve the Institute of Marine Engineers. Reference had been made to the proposed establishment of a third engineer's certificate, and, having regard to the great development that had taken place in marine engineering since the present rules were framed, he thought it absolutely necessary that some reform on the lines advocated by this Institute should be carried out. With regard to the Technical Institute now in course of erection for the borough of West Ham, the expense before it was finished would be something like £50,000, and he was in hopes that it would be started practically free from debt and have an income of something like £6,000 a year. If the work of the Institute was carried out in anything like a proper manner there would be an opportunity of securing the services of some of the best engineering professors of the day, even it they had to pay large sums for those services. He thought it would be a calamity if, in connection with this new institute, they went into mere elementary work; they ought to aim at something far higher, and they could not get that which they ought to have without paying heavily for it. The deputation from this Institute of Marine Engineers was received by the commtttee with all the respect due to such a body, and if they had searched England through they could not have found a man who would have stated the case of the Institute better than did Mr. Fortescue Flannery on this occasion. He would remind the gentlemen present, however, that the council of the new Technical Institute was composed of 48 members, and there were "some of all sorts." There were some members holding socialistic views, who apparently wanted to give the road-sweepers the same pay as was received by the borough engineer; and although the men of this class were not yet in the majority they were gradually gaining strength. He trusted, however, that the members of this Institute and every respectable voter would take an interest in local affairs, and see that they kept such men off the council. There was nothing definite settled yet with regard to the application by the deputation from the Institute of Marine Engineers, but he did know that before anything was settled there would be another meeting with that deputation to talk the matter over.

The proceedings then terminated.

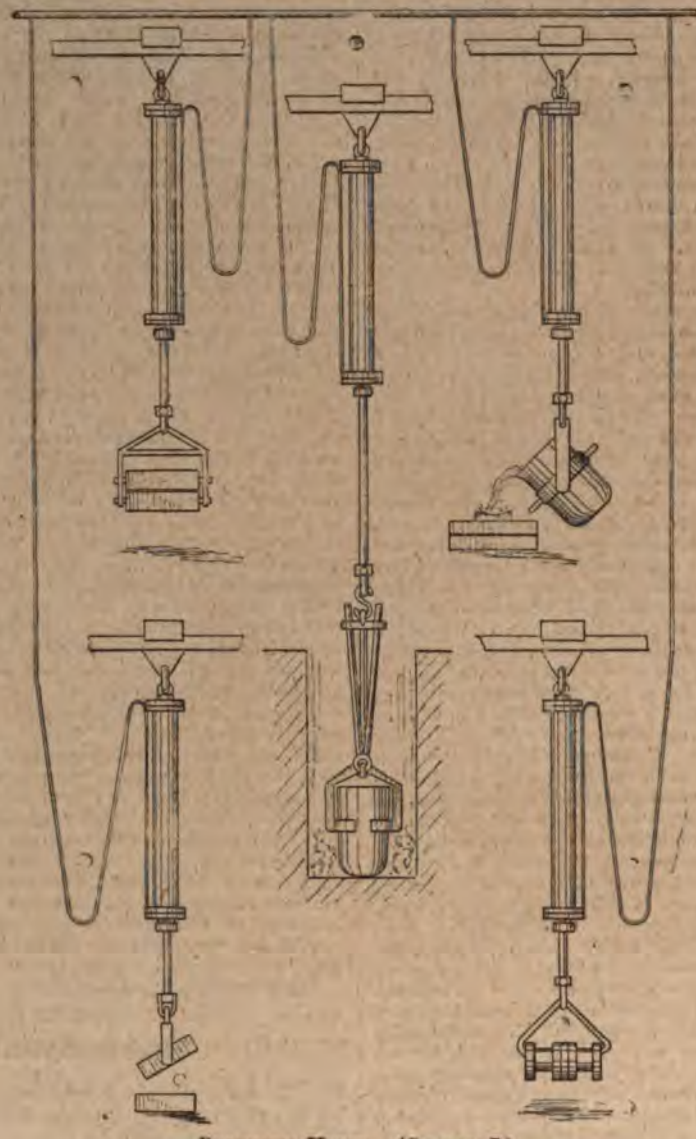
PNEUMATIC HOISTS.

WE have recently had the pleasure of inspecting a hoist worked on a new system as far as this country is concerned. The power is pneumatic, but as in many engine and boiler shops in the present day an installation of this character is already in existence for other purposes, there is not the difficulty in introducing such a handy appliance that there would have been some years back. Usually the air is taken round a building and down standpipes along the columns, for example, and flexible hose leads to the suction inlet on the machine.

As will be seen from the illustration of the design before us, the hoist can be used instead of the ordinary chains and pulley blocks, and travels at the head on a rail, the roller and rail being shewn in section. The apparatus consists simply of a cylinder of solid drawn

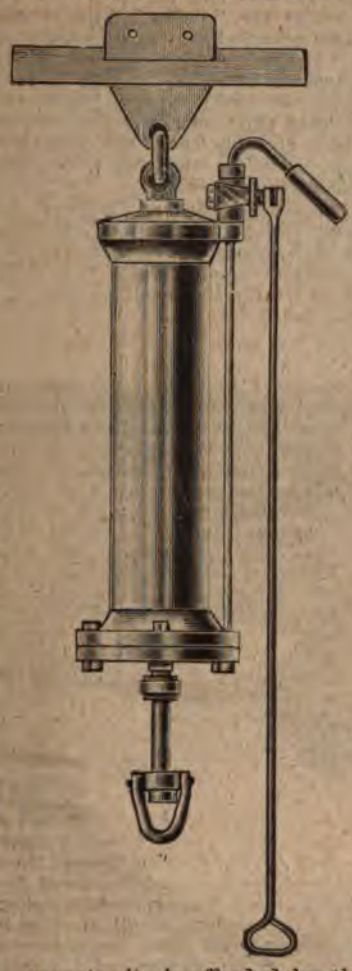
tube bored out to receive the piston, and hanging to the rod of which is the article to be lifted. The connection for the hose coupling is shewn, and the air passing down through the valve lifts the piston to the top of the cylinder. The valve is so constructed by a bye-pass arrangement that in the event of an accident to the pipe while lifting, which is obvious might occur, the piston cannot drop owing to a sudden release. The weight is thereby at all times lowered gently and the rate of the drop is regulated by the size of the exhaust in this valve. It will be seen therefore that there are no discharge pipes at all, the one pipe serves for inlet and outlet to the bottom of the piston and everything being simple cannot get out of order.

When we come to the uses to which a machine of this kind can be put we see that great assistance may be afforded in the various shops. Having lifted a job out of the lathe for example, with a complete system of travellers it may be carried away to just where required. This is possible by breaking the hose connection with a Westinghouse coupling and then making the joint again from another source of air supply. The same remark applies to the boiler shop, where the lift would be very handy for picking up plates and hauling them to the various shop machines for the work to be put on them. Again, in the foundry the moulds could be hoisted, the boxes broken, and the castings carried away to the fettling department. In short, the variety of purposes to which the device may be put are too numerous to mention. It is sufficient to say that with proper overhead travellers, about four tons can be pushed along by one man readily, and we are informed that in the United States this system is very generally adopted everywhere. Messrs. Tait, Howard & Co., Limited, of 63, Queen Victoria Street, who are introducing it into Great Britain, are ready to give a guarantee against all repairs for several years, and at the low cost a great deal of business should ensue. It only remains



Pneumatic Hoists. (*See page* 7.)

to say that our other illustration represents some of the varieties of work for which the hoist is adapted,



and that an opportunity is afforded by the firm for seeing it in operation to those who call on them.

SHIPBUILDING ENTERPRISE ON THE WEAR.

NOTWITHSTANDING the fact that last year Messrs. Doxford were very busily employed in building ships, they were able to give their attention to the erection of a new suite of offices, which for completeness of detail and general convenience are perhaps unequalled in the North. The old offices, though commodious and conveniently arranged, had in recent years become quite inadequate to the requirements of the firm's business, and as day by day the need of further accommodation became more pressingly apparent, the resolution was at length arrived at which has resulted in the erection of the present handsome edifice. The design of the building is original, but its novelty does not in the least detract from its utilitarian or artistic merits. The visitor, passing through folding-doors, enters the main hall, which occupies a very considerable portion of the building. At either side of this spacious apartment are the shipyard and engine-works drawing offices. A number of private offices for the use of members of the firm are provided at the end facing the entrance, and there are on the same floor two large pay offices for the shipbuilding and engineering departments respectively. The main hall is lighted from the roof, which is composed of exceptionally strong plate-glass. The departments and offices on the first floor, including a large reception-room, are reached from a gallery, access to which is gained by a handsome stairway at the end of the hall. The gallery leads first to the inquiry window in connection with the cashiers' and other departments, which, with a number of rooms reserved for special purposes, are at the end of the building, immediately above the commercial and private offices. At one side of the gallery is the Admiralty drawing office, which, as its name implies, is reserved exclusively for Government work, and which has direct communication with the drafting loft. On the opposite side is the accountants' office, and also the housekeeper's room, besides which there are spacious offices for the use of mercantile overseers, Admiralty ship overseers, and Admiralty engine overseers. That part of the gallery immediately above the entrance to the main hall leads to the photograph department, in which designs and tracings are photographed when necessary. From this point a good view is obtained of two finely executed portraits in oils—presumably those of the late Mr. and Mrs. Doxford—which are fixed in an arched space or niche that has evidently been specially reserved for them.

The furnishing of the various offices and rooms is most tasteful and appropriate, nothing being omitted which could in the least degree promote comfort or assist efficiency. The style of decoration is rich, though subdued; the harmonious arrangement of forms and colours producing an extremely pleasing effect. White and cream and delicate blue tints are very prevalent, and not the least attractive feature is the mosaic pavement in the floor of the main hall. Special rooms for telephone work are provided on each floor, and there is a strong room—which is also fireproof—in the basement. The ventilating arrangements are of the most approved kind, and the electric lighting installation is very complete, and in perfect keeping with the general equipment of the building. The centre of the main hall is occupied by a fine model of the s.s. *Golconda*, built by Messrs. Doxford in 1885. This vessel was, we believe, the largest cargo-boat afloat at the time of its construction, but since then the firm have had the honour of building for some of our leading steamship companies two or three much larger vessels. There are four other models in the hall, one of which—the model of the torpedo destroyer *Haughty*, built by Messrs. Doxford to the order of the Admiralty—is, with its beautiful equipment of electro-plated deck accessories, quite a work of art. Viewed from the exterior, the building is very imposing, a judicious blending of brickwork and red sandstone imparting to the facade a most attractive appearance. The approaches have been smoothly asphalted, and a grassy slope bordering the area in front of the building is an adjunct not to be despised. From various points of view on both banks of the river the building stands out conspicuously, and with its roof of glass forms an interesting landmark. Since the firm took the bold step of departing from the traditional methods of ship construction their business has prospered in the most satisfactory manner, and their productive resources have been utilised to the very fullest. In providing new offices of a more complete description than are usually to be met with, and which are in every detail specially suited to the needs of their business, they have again evidenced the determination to leave nothing undone which may assist in keeping the position of prominence they have attained.

HULL AND DISTRICT INSTITUTION OF ENGINEERS AND NAVAL ARCHITECTS.

ON Monday evening, February 22nd, the members of the above Institution met at the Institute Rooms, Bond Street, the President (R. Pawley, Esq.) in the chair, when the honorary secretary, Mr. George H. Strong, gave an interesting paper entitled, "Graphical and Mechanical Aids to Calculation." The author, after expressing his regret that such methods of saving valuable time had not in the past received the amount of attention they deserved, dealt with several of the principal objections often raised against their use, and then proceeded to give a lucid description of the various practical uses to which the graphic system of computation may be readily applied, entering most fully into the principles upon which the truth of such system were based.

The author having by ocular demonstration proved the utility of some particular system of arrangement as a graphical aid to calculation, then introduced to the notice of the members the system of plotting down on "squared" paper experimental and other data, pointing out that by the aid of such system of representation the various comparisons as to efficiency, &c., may

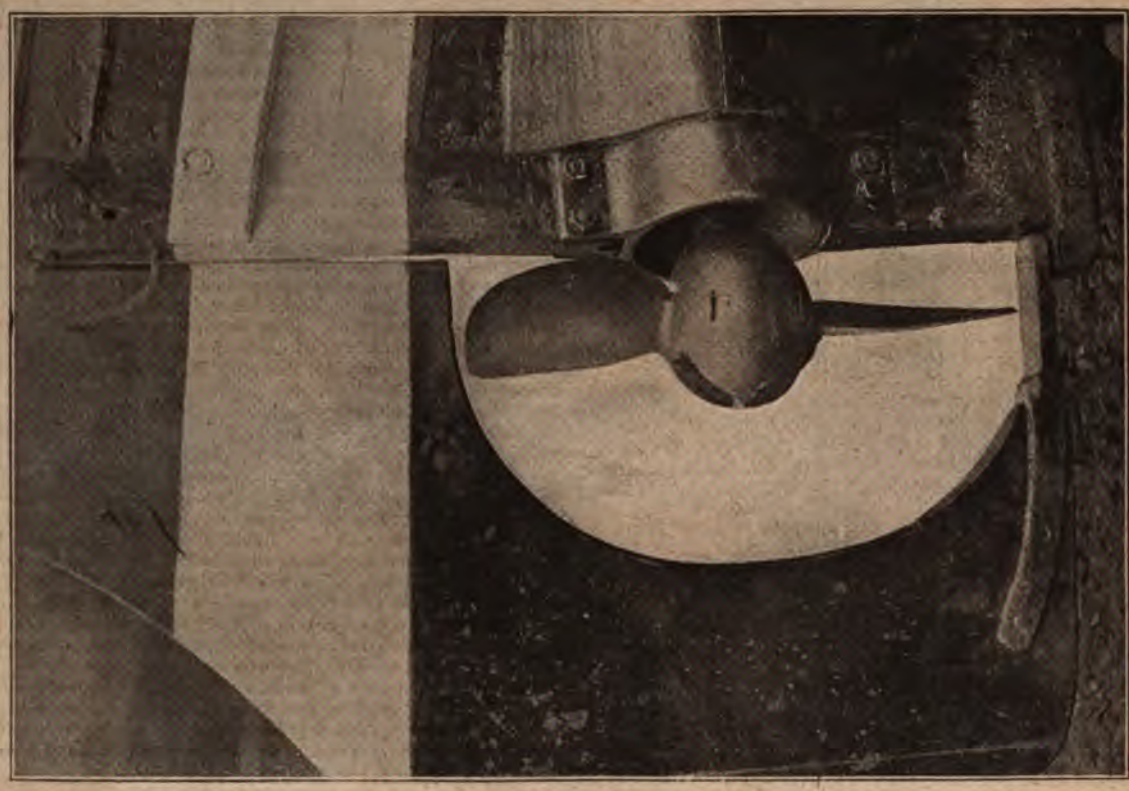
be more easily rendered manifest, the principles underlying the particular experiment more satisfactorily investigated, any irregularities due to errors of observation, or of calculation being most readily detected and allowed for. With the help of several pieces of string and a sheet of "squared" paper, Mr. Strong then demonstrated how the system could be applied to various problems which come within the province of the engineer, and also proved how certain formulæ, which, if dealt with by algebraic methods would require a knowledge of the higher stages of mathematics, could be investigated, and this even by those to whom mathematical reasoning and symbolic terms were to some extent a hidden mystery. An instance was also shown to demonstrate how the method may be applied to the arranging of the train services on busy railway routes, and upon the wall of the lecture-room was exhibited numerous graphic diagrams illustrating the system as applied to the computation of stresses on roof trusses and bridges, the proper proportioning of machine details, the comparison of experimental data, the enunciation of important problems and the solution of various formulæ.

In treating upon the question of mechanical aids to calculation, Mr. Strong then gave a most complete description of the points of construction of the slide rule, and in a most instructive manner explained the principles upon which its absolute precision depends. These several points were exhibited upon a 100-in. model slide rule prepared for the purpose. After showing how the slide rule may be applied to different calculations, mention was made as to the manner in which various mathematical ratios and practical formula should be arranged for simplicity of working. Several different makes of the "Gravet" slide rule were then exhibited, and the manner of working same explained, and various other types of slide rule designed for calculations of a specific character shown and described. The calculating "machine" or "Arithmometer" being also shown, and its manner of working commented upon.

The "Amsler" Polar Planimeter was next exhibited, and the author of the paper went fully into the principle of its action, proving by the aid of diagrams and a model of an elementary character how it is that this instrument may be relied upon to give most accurately the area of any closed figure (of regular or irregular form), merely by traversing the outline of such figure. He next exhibited and described that form of this instrument known as the "Coffin" diagram averager, and made clear to those present how the explanation given of the principle of the "Amsler" planimeter applied equally well to this type of instrument, and he concluded his paper by exhibiting and describing the latest type of planimeter, viz., the "Goodman" Hatchet planimeter, together with that form of the instrument made specially for use with indicator diagrams.

A large number of rules, instruments, diagrams, &c., &c., were on exhibition during the evening.

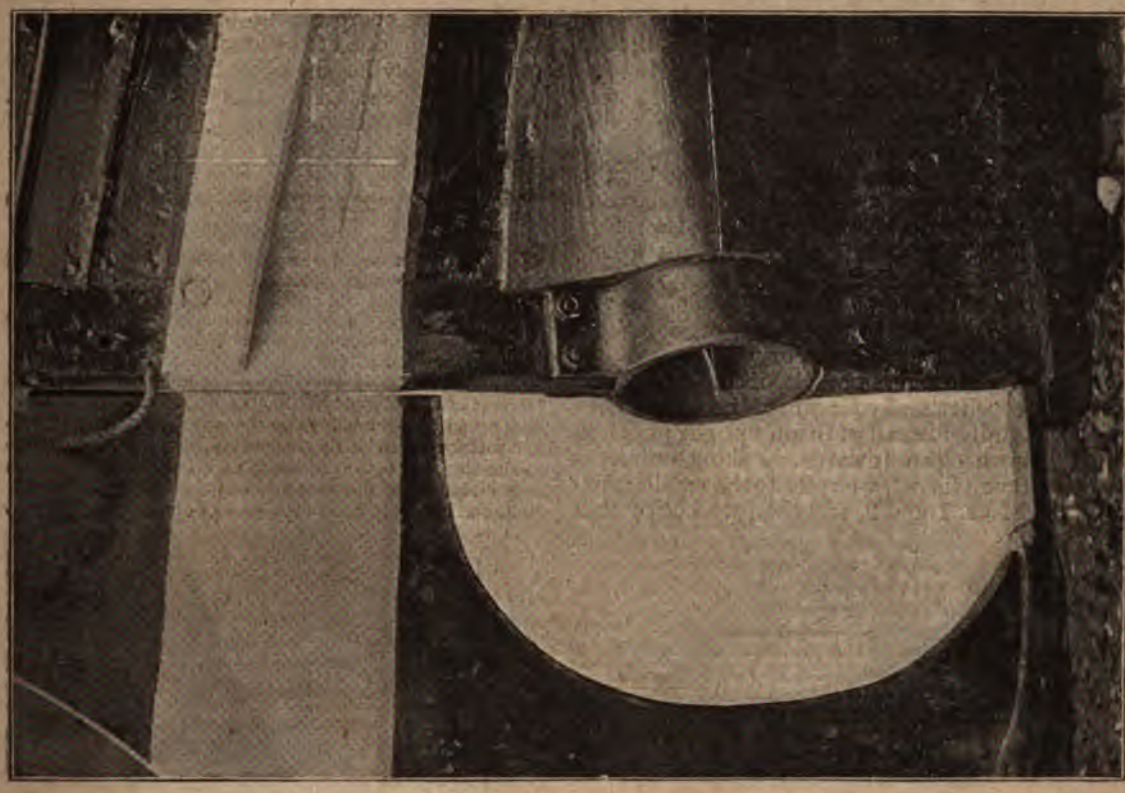
An interesting discussion followed the paper, in which the following gentlemen took part:—Messrs. R. Pawley, T. Wright, H. F. Fourny, A. N. Somerscales, and A. H. Tyacke, Mr. Strong replying to the points raised. A hearty vote of thanks to Mr. Strong, proposed by the President, and seconded by Mr. F. H. Pearson, was accorded at the close.



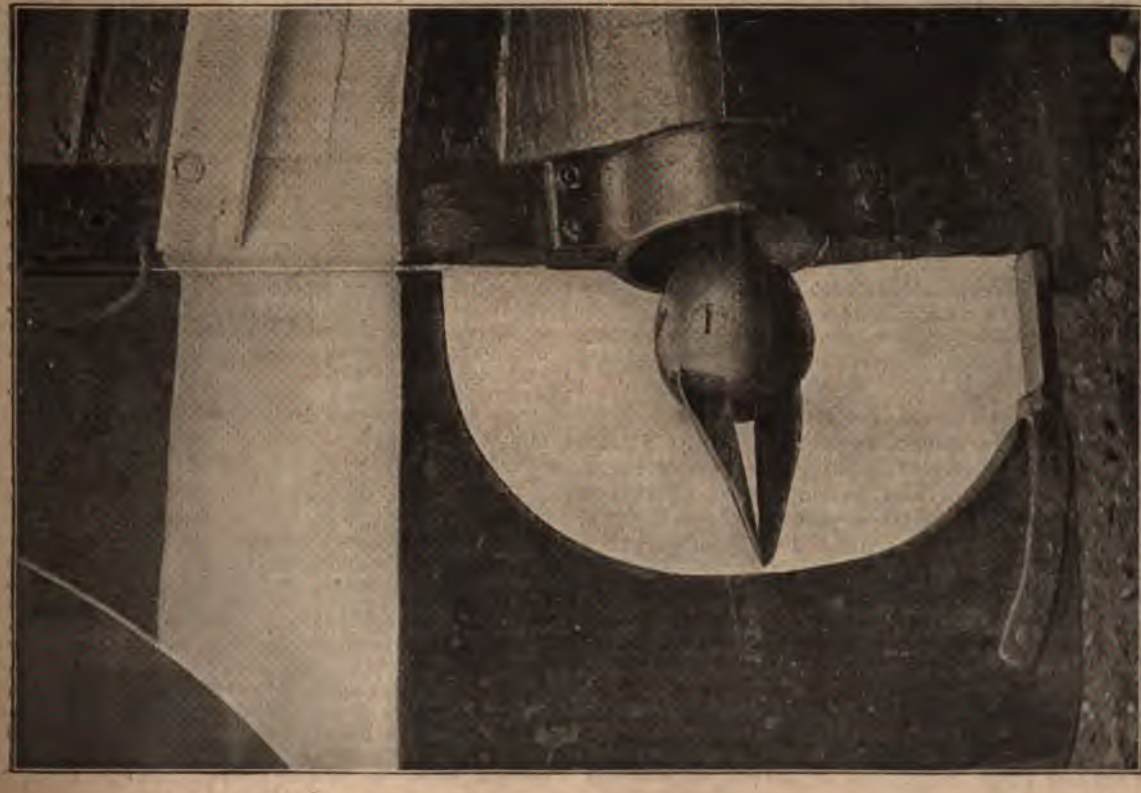
Propeller Expanded and Ready for Use.

AUXILIARY PROPULSION FOR SAILING VESSELS, &c.

A NEW form of propeller for the above and kindred purposes has lately been introduced by the Sheathing Propeller Co., of 72, Bishopsgate Street, London, the name of the firm being derived from the character of the propeller itself, which is to sheath or fold up the blades inside the hull of the vessel, and therefore out of the way when not in use. It is obvious if this could be satisfactorily accomplished, it would be a boon to the yachtsman, more especially as taking to the pastime for sport, he has little love for engines, boilers, and all the disadvantages that come with the adoption of steam or other motive power than that given by the wind. Still it is not pleasant to be becalmed, perhaps, for days, therefore, what cannot be cured has to be endured, and hence we find

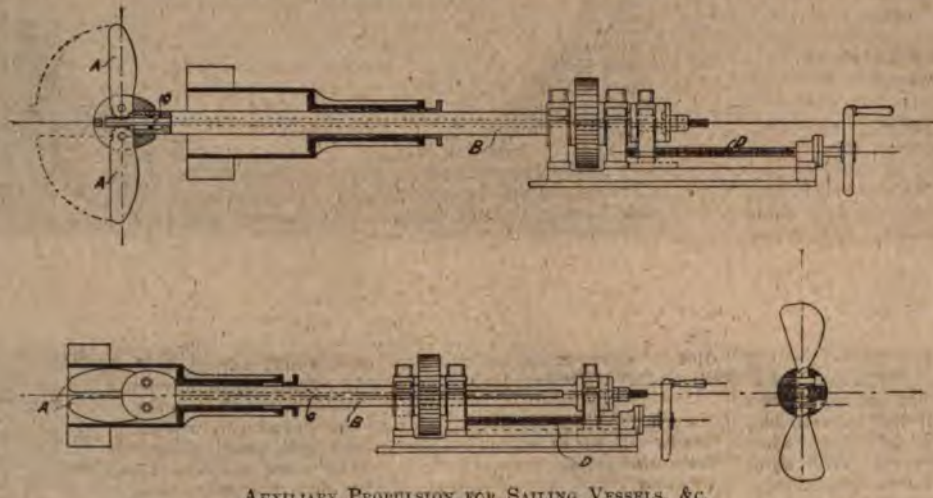


PROPELLER SHEATHED.



PROPELLER PROJECTED.

auxiliary steam greatly in vogue in gentlemen's floating palaces. The principle hitherto familiar to us, has been to feather the blades, that is to say, to turn them on the boss in a line with the keel so as to offer as little resistance as possible to the way of the vessel when under sail. Another plan was to disconnect the whole arrangement from the shaft, and lift it out of the water up a well constructed at the stern for the purpose. In the first case the whole of the resistance was not done away with, and in the second a weakness of the hull was caused by the part cut away, besides the clumsiness of the system generally. Here it will be observed, from the illustrations which accompany, neither of these drawbacks is apparent. When sheathed, boss and blades disappear within the stern tube altogether, and therefore out of the way. We see first the propeller ready for work, then the blades turned horizontally instead of in an upright position, and finally drawn clean inwards. Asking ourselves how this is accomplished, we refer to the smaller diagrams marked Nos. 1 and 2, and then we notice that



Auxiliary Propulsion for Sailing Vessels, &c.

the blades are pivoted on the boss, and that inside the shaft B there is an inner shaft C, which at the propeller end has a rack upon it gearing with the pinions on the blades. When, therefore, this gear works, the blades fall flat round the pivots mentioned. The screw D being then brought into operation, the whole apparatus is brought into the tube in the ship's stern.

We must refer our readers to the company itself for the means of carrying the system out in its entirety, but various methods will suggest themselves to engineers for putting the principle into operation. The views we give are on a yacht of 7 tons, y.m., and if it may be further extended to fishing vessels which already use steam for heaving up their trawling gear, we may be sure it will meet a want, because hitherto nothing has been devised in this way capable of being housed so as not to interfere with the nets, &c.

Another use for which the inventor puts the system forward is for steering ironclads. He proposes to put sheathing propellers on each side of the ship's stern and use the force thus given to assist the vessel's course in a narrow waterway, like the Medway, for example. If there are no practical difficulties in the way of using one of the auxiliary engines for such an object it may be an advantage, and at some future time we may return to this subject again, when we have further plans before us.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

THE First Lord's Memorandum, explanatory of the Navy Estimates, has been presented to Parliament, and shows that the sum asked for is £21,838,000, as against £21,823,000 last year. There is therefore a net increase of £15,000. The interest of the present Estimates does not, however, rest in the sum asked for so much as in the way in which it is to be spent, and moreover, taken by themselves, these figures are somewhat misleading, since they contain no reference to the supplementary estimates of the past and to those which are almost certain to be forthcoming before the end of the present financial year.

In regard to the number of officers and men voted for this year, an increase is shown of £6,300, bringing the total to £100,050. This is a very large increase, and is divided over almost every class and grade in the Navy. It is accompanied by new regulations in regard to the Royal Naval Reserve which it is hoped will tend to the increase of that body. It is, however, curious in this connection that no large provision has been made for an increase, and therefore it may perhaps be expected that the authorities do not anticipate any very large immediate benefit from their new scheme. Among other concessions to the petty officers and men of the service we must mention the establishment of a new grade of engineer-officer of warrant rank, which can only be regarded as a most satisfactory encouragement to engine-room artificers who have rendered meritorious service, and a step which will contribute towards meeting the growing requirements of the fleet. Turning from the *personnel*, the new shipbuilding pregramme includes four battleships, three third-class cruisers, two sloops, four gunboats, and two torpedo-boat destroyers. Of these vessels three of the battleships, the three cruisers, and the two sloops will be built in the public yards, the others by contract. The three battleships are to be laid down as soon as those of the *Canopus* class building in the yards have been launched. This programme has not met with universal approval. The increase in *personnel* is considered most satisfactory, but it would have pleased many critics if more vessels had been included in the shipbuilding programme. The difficulty appears to rest with an insufficient supply of armour, but as this does not affect the cruisers to any great extent it has been

thought that more vessels of that class should have been put in hand.

Benin and Crete.

The punitive expedition undertaken against the recalcitrant King of Benin has proved most successful. The seamen and marines of the ships on the West Coast of Africa station, assisted by the forces of the Niger Coast Protectorate, surmounted all the difficulties in their way, and although at the loss of some valuable lives carried the town at the point of the bayonet. Admiral Harry Rawson, who was personally in command of the expedition, has received from the Queen a kind and sympathetic message of commendation and congratulation, in which all his countrymen will join. The squadron has already dispersed, the *Theseus* and *Forte* returning to the Mediterranean, and the hospital ship *Malacca* to this country. It is satisfactory to know that the wounded are all doing well. In another direction, too, our soldiers and seamen are at work. The European Powers having decided that the Greeks must withdraw from Crete, and in face of the fact that the Government of the Hellenes would not take this step voluntarily, have determined on coercion. A blockade of the island of Crete by the ships of the six great Powers has commenced, and it is possible that it may be extended to certain harbours of Greece. Moreover, each of the Powers has despatched a force to Crete for the purpose of assisting in preserving order, if not for the enforcement of their wishes. What will be the outcome of these measures in the excited state of the Greek populace and the threatening circumstance that on the frontier of Thessaly Greek and Turkish troops stand face to face, is by no means clear. Both nations are preparing for trouble, and Turkey has even done what no one supposed she was capable of accomplishing—she has mobilised a small squadron, and despatched it from the Golden Horn to Gallipoli. The powers appear to be unanimous in their determination to preserve the peace of Europe, but in Macedonia all the elements of a conflagration are present, and at any time a spark may set the inflammatory particles in a blaze.

The Queen's Diamond Jubilee.

In connection with the Diamond Jubilee of the Queen it is certain that if favourable weather conditions prevail the Review at Spithead of the Fleet will put that of the Jubilee year quite into the shade. Every vessel available will take part in the show, including the torpedo-boat destroyers now finishing, if they are ready in time. Vessels taking out crews to the foreign stations will do the voyage as quickly as possible, and hurry back to take part. As regards the celebration in London, over three thousand men from the fleet are to take part, drafts being sent up to London from Portsmouth and the other ports in the South. The *Britannia* training ship will be represented by one hundred and fifty cadets, who are to sleep at the Royal Naval College at Greenwich for the night. The Fleet will mobilise on the 8th of June, and the Review will take place on the following Saturday fortnight. A suggestion has been made that a couple of gunboats should be placed just below London Bridge for the purpose of firing a salute as the Queen passes over the bridge, and another suggestion put forward is that a flotilla of torpedo boats should be anchored near Westminster Bridge, in order to salute Her Majesty as she passes there, supposing that the procession passes that way after all.

Portsmouth Dockyard.

As in every other yard work is more than plentiful here, in fact there is a glut of it, and as a consequence the *Powerful*, *Terrible*, and *Cæsar* are growing at a wonderful rate. Captain W. C. Karslake, after being in command here for three years, has retired, and Captain W. H. May has taken up the duties of flag captain. Nothing but praise has been found for Captain Karslake, when he was entertained at his farewell dinner, at which Commander Anson presided. During the three years he has been with us he has been noted for his determination to be just in everything, and considering the numbers under his command it is surprising that he has carried out his purpose so efficiently and with so little friction. Many vessels are undergoing repairs and alterations, among which are the "flat iron" gunboat *Pincher*, which has had a new boiler fitted and developed 200 H.P. in a trial, at a speed of about seven knots. The *Hornet* has had her broken piston rods seen to and the *Eclipse* is having her bottom coated before leaving for her commission on the East Indies Station. Looking at the new Estimates one sees that we are to complete the *Cæsar* and *Mars*, and £57,000 is to be spent on labour alone of the former vessel. The *Canopus* is to be advanced, and we are to have the *Hannibal* sent here from Pembroke to complete. A battleship of the *Canopus* class is to be commenced, as is a new third-class cruiser. It is to be regretted that with all the work to be done the Admiralty should have determined to gradually reduce the hands. Up to the present the *Canopus* has had over 1,500 tons built into her.

The New Wing of the Naval Engineering College.

It is understood that the Duke of York will perform the ceremony of opening the new wing of the Naval Engineering College at Keyham soon after the Midsummer vacation is over. The addition, which was begun in September, 1895, is now approaching completion. The extension consists of two separate buildings, in one of which the students will sleep and take their meals, and the other will be used as the educational branch. This latter will allow of provision being made for over fifty students extra, which will bring the number studying at the College up to one hundred and fifty. The architecture of the new building will be identical with that of the old one. It will be approached by a handsome entrance hall, and the whole of the interior arrangements, such as furniture, decorations, &c., will be of an especially elaborate nature. That the present overcrowding in the recreation room may be somewhat relieved, a fine lofty room has been built just at the entrance to the new wing, which will be used for this purpose by the senior students. The lecture and class-rooms will be spacious and well-lighted, and there will be rooms for experiments and demonstrations, and a workshop connected with the present laboratory. Hot water is to be the means employed to heat the building. The old dining-hall has been extended so that it will now be possible to seat the whole of the students at the same time. Major Kenyon, R.E., has been responsible for the carrying out of the work, assisted by Mr. F. W. Kite. The extension will be a distinct improvement to such an important institution. It is to be regretted that measles has broken out here among the students. The outbreak is supposed to have originated in the *Impregnable*.

Overtime in the Dockyards.

It seems that in order to spend the money already voted before the end of the financial year, that the whole of the Government yards have been working at full pressure, and overtime, and plenty of it, has been the order of the day just lately. Between 1,500 and 2,000 men have been working overtime at Portsmouth so as to spend the unexhausted balance of money in hand, and practically the same story comes from Devonport, Chatham, Sheerness, and Pembroke. Most of the hands have almost doubled their wages, working until eight and nine o'clock at night at some of the yards, as well as on Saturday afternoon, although the men are somewhat averse to this, saying that they would rather work later in the week than be deprived of any of their Saturday half-holiday. The Admiralty at the end of each financial year are expected to return all unexpended balances. But this was not found to be very economical, and so, with the Treasurer's permission, a readjustment of allocation was made, and the money saved in one direction was usefully spent in another.

The Salary of the Engineer-in-Chief of the Navy.

There is one item in the Navy Estimates, which have recently been under discussion, which we are sure everyone interested in the welfare of the Navy, and the engineering department especially, will be pleased to see. This is the addition which the Naval Lords have thought fit to make to the salary of Mr. Durston, the Engineer-in-Chief of the Navy. That he thoroughly deserves this nobody will deny, for the substantial advance in the speed of our fighting ships is primarily due to him, as is also the substitution of watertube for return-tube boilers, in fact, during the time he has been in office the speed of our warships has been nearly doubled. Commencing with the new financial year his salary will be £1,800 a year, in place of the £1,300 he has now been receiving for many years past. The Chief Engineer Inspector of Machinery, Mr. R. J. Butler, also benefits to the extent of £197 a year extra, making £1,050 altogether. Mr. Oram is to receive £756 instead of £690, and Mr. Rudd £825 instead of £655. Several other officers in the same department have had their salaries increased to an appreciable extent, upon which good fortune we congratulate them.

Devonport Dockyard.

The greatest activity reigns here. The growth of the *Ocean* is little short of marvellous, although she was only commenced six weeks since the number of tons at present built into her already runs well into four figures. Her launch is looked forward to in nine months' time, which if it proves true will indeed be a record for building. It was doubtful at first whether the *Edgar* would be ready for the pennant by the time specified by the Admiralty, and in consequence of a delay occurring before a satisfactory test of her engines could be obtained, the Admiralty were approached as to whether a slight postponement was possible. But the authorities would hear of no such delay. The *Edgar* has had an expensive outfit, necessitating a cost of £15,000, since her last commission on the China station. The *Howe* is to be taken in hand here for a refit, as are the *Benbow*, *Thunderer*, *Colossus* and *Melampus*. The damages which the *Decoy* sustained recently have been made good and she is now in readiness to join the *Opposum* and *Ferret* for further cruising. The new programme of work to be given out to this yard is very satisfactory. A second battleship is to be commenced as soon as the *Ocean* is finished, and a third-class cruiser taken in hand, and it is expected that this will be an exceedingly busy and important one as regards constructive work. An exceedingly favourable impression has been produced here by the concession made to engine-room artificers, by which this branch gets warrant rank. The condition as to the length of service before promotion somewhat takes the gilt off the gingerbread, but the creation of such a rank indicates that the Admiralty are aware of the value of such men.

The Recent Concessions to Fleet Engineers.

The concessions recently made by the Admiralty in order to fill up the too numerous vacancies in the ranks of fleet engineers do not appear to be of much more than a stopgap nature. The opinion has been expressed that the attempt will probably be about as futile as its predecessors, and that the Admiralty have been driven to the course they have taken by the injudicious policy that they thought fit to adopt some years ago, but we do not wholly concur in this opinion, for since the plan in question was inaugurated several assistant engineers have come into the Navy. An examination for direct appointment as probationary assistant engineer is to take place at Greenwich early in June next. The age of candidates is to be between twenty and twenty-three years of age, and they must have undergone three years' training at an engineering establishment of repute, in addition to having attended the classes of a recognized engineer college for at least one year. But unless an amendment is made to the effect that in a few years the youngest assistant engineer will be able to reach fleet rank before he reaches the age of retirement in the subordinate rank, it is not possible that many outsiders will be induced to enter, for without this their chances of promotion in her Majesty's Navy do not appear to be a very rosy one. It may be here mentioned that a correspondent writing to the *Times* a few days ago, points out that as candidates for the engineering branch of the Navy must not be less than fourteen or over seventeen years of age on the 1st of May in the year in which they are to be examined, it is rather hard that as the examination takes place a little earlier than this date those boys whose birthday falls in the latter part of April, have to compete with those who, though nominally of the same age as regards the examination have had a year's more preparation. He therefore suggests that as a simple way of mitigating the grievance, that the examination be held twice a year instead of once only.

Fatalities in the Navy last Month.

During the past few weeks many accidents, most of which, we are sorry to say, have resulted in loss of life, have occurred. About a month ago the funerals were announced of two gunners of the Royal Marine Artillery. The deceased belonged to the port-guardship *Sans Pareil*, and were found in a dazed state outside the spirit room of this vessel, their death taking place shortly afterwards from alcoholic poisoning. It is supposed that the men broached a cask of rum and drank the spirit through an electric coil. Another death, which took place early last month, was that of Daniel Yeates, a leading stoker of H.M.S. *Howe*, owing to the explosion which took place on board that ship when in Cork Harbour. A seamen named George Cook, of H.M.S. *Resolution*, was buried at sea on the 1st of last month, the Channel Squadron meanwhile stopping engines and lowering colours to half-mast. He had met his death through a fall, in which he sustained a fractured skull. A misadventure occurred too, on H.M.S. *Hydra*, in which two seamen, named A. Jones and A. Honess, were suffocated by sleeping in an airtight compartment, contrary to regulations. At the inquest held a verdict of "Death through misadventure" was returned. Another sad accident was that which happened in Kingstown Harbour recently, in which two boatmen and surgeon T. Gibbons met their death. The latter in company with Lieut. Ellison, engineer G. G. Knight and assistant-engineer H. W. L. Cocks, were going out to their ship when the boat capsized, and the whole party were thrown into the water. Assistance was immediately forthcoming from H.M.S. *Jason*, and the four officers were rescued, but surgeon Gibbons succumbed shortly after.

Chatham Dockyard.

At this yard there is no cause for grumbling at the amount or importance of the work allotted to it by the Naval Estimates. A comparison of the money expended in 1896-7, and that to be spent in 1897-8 shows that there is very little difference in the amount. The gun-boat, which is said to have never given entire satisfaction, is now laid up here, and is to have a new set of boilers, water-tube, in place of the present ones, which are of the old locomotive type. This means that her speed will be increased considerably. A serious outbreak of fire occurred recently at this yard, and which, but for being discovered in time, might have resulted in the destruction of the stores. One of the tar vats became ignited, and but for the efforts of the police fire brigade would have spread considerably. The chief work for the financial year just commenced will be the commencement of a new battleship and a third-class cruiser of 2,135 tons displacement. £10,000 will be spent on labour for the former, and over £16,000 for the latter. A good deal of money is to be spent on different vessels for repairs, alterations, &c. £13,185 is to be expended on the *Dreadnought*, £17,000 is apportioned to the *Rodney*, at present in the Mediterranean, £19,000 to the *Arethusa*, and £4,883 to the *Tartar*, at present in the West Indies. Much money, too, is to be spent on the yard itself, including £10,000 for dredging, in addition to the £100,000 odd already spent. The new battleship *Illustrious* increases apace, and she is now in course of completion in dry dock here, and work is progressing on the *Goliath* and *Vindictive*, the former vessel having had over a thousand tons worked into her.

The Torpedo Tubes of the "Canopus."

The decision arrived at by the Admiralty with regard to the torpedo armaments of the *Canopus* and battleships of a like class, is undoubtedly an important one. Originally the *Canopus* was to be fitted provided with five tubes, four submerged and one exposed, but this latter will now be omitted. One of the chief reasons which induced the Admiralty to come to this decision was the danger exposed tubes run of being exploded during a fight by the bullets of quick-firing guns of an enemy's ship, and so proving the means of seriously crippling or totally destroying the ship which carries them. At present nearly all our ships are fitted with torpedo tubes above the water-line, and the question arises, shall exposed tubes be done away with, even at the great expense which must necessarily be entailed. Of course, it is equally as dangerous for one ship to go into action carrying exposed tubes as another, and to simply argue that foreign ships would be in the same predicament as our own does not lessen the danger in the slightest. The cost of the alteration would be great, we are aware, but this should not have any deterrent effect upon the Admiralty, for the result of the policy of allowing the foreign powers to lead the way in all such innovations can be seen when we consider that at this moment we have sixteen vessels armed with obsolete muzzle-loading guns, consequent upon our waiting until all the other Powers had practically re-armed the whole of their fleets with breech-loading guns before we saw the value of such a step, and commenced doing so ourselves.

The Navy on the Stage.

We have at the present time nearly half a dozen plays running in London which are either entirely nautical or in some way connected with the Navy, and the greater part of them are playing to crowded houses. At the Adelphi "Black Eye'd Susan" has now been running for some time, and "The Mariners of England" has just made its appearance at the old Olympic in Wych Street, and we have Forbes Robertson and Mrs. Patrick Campbell taking the principal characters in a play

called "Nelson's Enchantress," at the Avenue Theatre. There are also one or two other plays indirectly dealing with naval life. The last-mentioned play has been subjected to much adverse criticism, with which we cordially agree, owing to the fact that it does not treat our great naval hero with the respect which is his due. Everybody is familiar with "Black Eye'd Susan," but not so with the new production at the Olympic. This, to all accounts, is a play of the old barn-storming variety. Curiously enough, it introduces coast-guardsmen, while at the period the play takes place there were none. Many other mistakes are apparent. Nelson, for instance, speaks of himself as the Lord High Admiral, and much of the detail in connection with the dress of the officers is altogether wrong. But it is assuredly a good sign when so much interest is taken in the Navy, and we can do no more than hope that good naval dramas will always be successful.

Sheerness Dockyard.

Although the programme of work for the coming year is not entirely up to expectations, still there is slight cause for dissatisfaction. Two new sloops are to be built, counterparts of the *Torch* and *Alert*. It is not expected that much work will be done on them this year, if any at all before Christmas next, as the wages vote is only £1,000. The additional £3,000 is for the Chief Engineer's Department. The cruiser *Pelorus* has been launched, and only requires her engines and boilers to be placed in her. There promises to be plenty of work in the repairing branch. The repair of the *Racoon* is to be undertaken, and the *Swallow* is to be finished off. The *Barracouta*, *Buzzard*, and *Acorn* are to be taken in hand. Of the latter, the first-named will be the first to be taken in hand. The *Haughty* is now undergoing a refit, and her crew transferred to the *Swordfish*. The steam trials of the *Jupiter* have been very successful, she completing the whole of them in four days. When ready she will return here for her gun-mounting trials. The work on the *Pomone* and *Proserpine* is being pushed forward as much as possible, and it is thought that the former will reach completion about the same time as the latter, although she was begun nearly a year later.

The Shipbuilding Progress of France and Russia.

It is interesting to note at the present time, when so much attention is being directed to Naval construction, the progress in shipbuilding which is being made in the French and Russian yards. Take France first. The French Minister of Marine, in a statement made by him a short time ago, said that France had 29 battleships built, six building, and one, as yet, on paper only. The smaller half of the 29 completed may be termed first-class, the others belonging to second and third classes. The new first-class battleship the *Massena*, is to be completed by the end of this year, and the *Charlemagne* and *Bouvet* are to be completed early next year. The *Gaulois* is to be ready in two years' time, the *St. Louis* in three, and the *Henri IV.* a year later. France's ally, Russia, is as silent as the Sphinx concerning her shipbuilding programme, but as far as we can gather she has six battleships building, three of which have been launched and are now completing. Russia is already possessed of six first-class battleships besides a considerable fleet of coast defence armour-clads, and to all appearances by the end of the year she will have 10 first-class battleships afloat. Comparing the above with the English shipbuilding programme, we have some little cause for congratulation. England has an official total of 45 battleships, 26 of which of the first-class are completed and eight are building or designed. She has 12 second-class, but three-quarters of these are armed with muzzle-loaders, and 11 third-class, and eight of these are carrying muzzle-loading guns. Thus comparing the battleships built and building of France and Russia as against our own, the advantage appears to be somewhat on our side.

Spain's New River Gunboats

Despite the great strain the Cuban rebellion must be upon the finances of Spain, for the war has now been raging for two years or thereabouts, that country, although she has been declared bankrupt times out of number, still finds enough money to vigorously prosecute the rebellion now going on in the Philippine islands. Her latest move is to have two gunboats specially constructed to guard Lake Lanao, in the Island of Mindanao. The vessels were built at Cavite, Luzon, and have been named the *Almonte* and *Curcuera*, after the two brigantines constructed by Hernando Cortes on the Lake of Mexico. They are intended for much the same purpose as those we have built for service on the Nile and Zambesi, but do not resemble those boats very much, having a pecular shape all their own. They were designed by the Engineer-in-Chief of the Philippines, Don Manuel Rodriguez. They are 95 ft. long and 19 ft. wide, are capable of 175 H.P. with a speed of 10 knots an hour, which will be as much as is required of them for the work they will be required for. Their armament consists of two quick-firing guns, one at either end of the superstructure, and some smaller weapons on the port-side. It is an uphill fight which Spain is waging, but she is making great efforts, and many are of the opinion that success will shortly crown her.

Pembroke Dockyard.

General satisfaction is expressed here at the statement of the First Lord of the Admiralty on the shipbuilding programme. It has been definitely settled now that the new Royal yacht is to be built here, and the selection of this yard is doubtless chiefly due to the commodious building sheds here. The progress of the *Andromeda* continues to be satisfactory, and her launch was fixed to take place on the 30th of this month. She is now practically ready for her engines and boilers, but it is possible that she may not leave at this date after all. It is believed the hands now employed will be shortened owing to the probable departure of the *Hannibal* in about six months time.

German Naval Demands.

The demands made by the German Minister of Marine, Admiral Hollmann, has come as a surprise to many, and a great number of German newspapers bitterly oppose the new proposals. The Reichstag understood from the Government that no such proposals were to be brought forward. They were merely told that modern ships would take the place of the obsolete ones in the German Navy, and it appears to have been owing to this explanation that they were induced to relax their opposition to many other Government proposals. The Government intimated that they merely intended to replace the old ships, but to build a new and powerful cruiser to take the place of one that has been useless for years is simply adding new ships to the Navy. It is proposed to spend 182,883,000 marks on new construction during the three financial years 1898 to 1901, and when the demands for 1897-8 are added to this, and the remainder of votes taken over from previous years, the total expenditure amounts to 328,371,000 marks, over sixteen and a-half millions sterling.

Admiral Hollman's Reasons.

The German Naval Minister explained to the Reichstag that the reason for the demands was that the Government wished to make Germany strong enough to fight both afloat and ashore. He declared that it must be rendered impossible for an enemy to be able to blockade the German coasts. He assured them that the present fleet was inadequate to prevent this and unable to exert pressure in distant seas, which was what Germany had to be able to do, or her influence, to quote what the Admiral is reported to have said, "would go to the devil." At present Germany has two battleships in hand, the *Kaiserin Friedrich III.* and the *Ersatz Friedrich der Grosse*, the armoured cruiser *Ersatz Leipzig*, the second-class cruiser *Ersatz Freya*, and four others known at present by the letters *K. L. M.* and *N.*, the fourth-class cruiser *G.*, and a divisional torpedo boat. The proposals to which so much opposition has been shown include four battleships, the cost of which is to be 80,000,000 marks, six second-class cruisers at a cost of 84,000,000 marks, one gun-boat, two despatch boats, and twenty-seven torpedo boats. Subsequently when defending the new programme Admiral Hollman declared that the demands were the minimum of what were required, emphasizing this by striking the table in the Chamber with his fist. It is supposed that the Reichstag will be dissolved if the demands are refused, and the Secretary for the Navy has tendered his resignation, but it has not been accepted, although it is said that he has made up his mind to resign unless the Estimates for 1897-8 are voted.

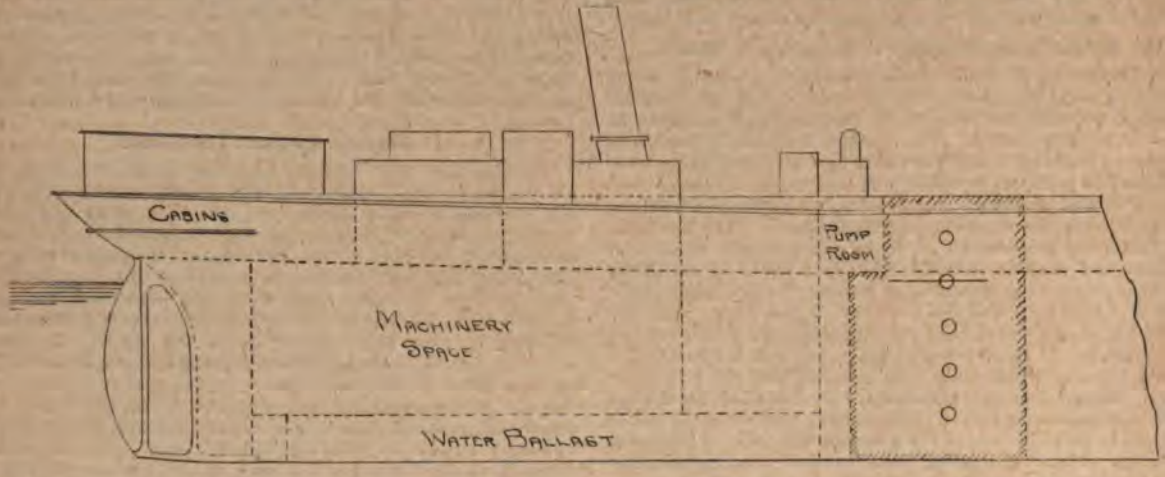
The "Nord Express."—The new daily service of the "Nord Express," *train de luxe*, between Ostend and Berlin will be inaugurated on the 1st of May. On Wednesday and Saturday in each week, the service will be extended to and from St. Petersburg, but the special steamer now leaving Ostend on Thursday at 1.20 p.m., on the arrival of the train from St. Petersburg, will after that date depart on Friday, and a supplementary special steamer will leave Ostend for Dover on each succeeding Monday.

THE CONSEQUENCES OF COLLISIONS TO LOADED OIL TANK STEAMERS.

By H. Joshua Phillips, F.I.C., F.C.S.

In his capacity as technical adviser to various corporations upon questions relating to the safety of the importation of petroleum into this country, the writer has frequently been asked as to what would happen to a loaded oil tank steamer provided it took part in a collision. Consequent upon no instructive collision having taken place up to the present time nothing of a definite nature could be stated. Of course much would depend upon the nature and whereabouts of the damage together with the state of the elements. If a hole were knocked into the engineer's department in the vicinity of the water-line the vessel would doubtless sink, or if two or three tanks were torn open the vessel would sink so low that the amount of free board left would be inadequate for the safety of the vessel, especially in a rough sea. Damage done to the cofferdams would occasion a leak of oil into the stoke-hole, which would doubtless take fire and very probably be followed by an explosion.

Differences of opinion having been expressed as to the result of an opening made into the oil tanks, at various depths below the water-line, a model tank vessel was constructed, and into the tank amidships there [bored] six holes—*vide* [sketch—provided with



loosely fitting rubber plugs. The holes were equi-distant from each other, (1) being above the water-line, (2) on the water-line, (3), (4) and (5) below the line, and (6) at the keels. In each of the experiments tried, pretroleum oil, sp. gr. ·825, was poured into the experimental tank to a definite mark above the water-line and first opening, and the vessel floated in a reservoir of water and ballasted until it sank to the level of the water-line. The vessel was towed about in the water by means of a piece of string fastened at the bow, and a rough sea was imitated by agitation of the water.

Upon removing the plug from No. 1 hole under the above conditions in steady water, the oil ran out just below the hole, the vessel at the same time slightly rising above the water-line; upon the vessel being made to travel in rough water, the rocking and rolling brought out some more oil and at the same time some water gained admission consequent upon the opening being occasionally under water.

No. 1 plug was now inserted and the tank refilled with oil and No. 2 plug taken out. In steady water the oil ran out to the bottom level of the opening and the vessel rose above the line. In rough water more oil ran out and the outside water ran in and sank to the bottom, and this displacement of oil by the water continued to take place until the whole of the oil was eliminated and water had taken its place.

No. 2 plug was inserted and the tank refilled with oil as before and No. 3 plug taken out. Oil issued out of the opening and ascended through the water to the surface, the vessel was slightly raised, but the opening still remained under water. It was observed that while the vessel was in comparatively smooth water, water gradually entered and displaced oil, which issued to the surface in globules; in rough water this action was accelerated, the vessel at the same time slightly sinking—owing to the difference in gravity of the liquids—until the water entering the tank rose above the opening, the remaining oil in the tank permanently floating upon it. Similar experiments with openings Nos. 4 and 5 gave the same results, no further oil escaping when the water had risen above the openings inside the tank.

Upon an opening being made at the keel of a loaded tank, oil would run out until the levels were adjusted, but in a rough sea some water would enter thus a loaded steamer with an opening made at the keel could proceed on her voyage without losing a great quantity of oil.

Iron and Steel Institute.—The annual meeting of this Institute will be held at the Institution of Civil Engineers, Great George Street, London, on Tuesday and Wednesday, the 11th and 12th of May, 1897. At this meeting the council will present their report for the year 1896, the president-elect will deliver his inaugural address, and a number of papers will be read and discussed. The Bessemer Gold Medal for 1897 will be presented to Sir Frederick A. Abel, Bart., K.C.B., D.C.L., D.Sc., F.R.S. The annual dinner of the Institute will be held on May 11th, in the grand hall of the Hotel Cecil. A detailed programme will be issued in due course. The autumn meeting of the Institute will be held at Cardiff, August 10th to 13th.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

Liverpool Improvements.

THE extension of facilities at Liverpool goes on apace though there is not much "booming the port" in the Daily Press. The latest addition to the conveniences of the port was the opening to the public on the 13th March of the northern extension of the landing stage. This extension adds another 400 ft. to the former respectable total of 2,463 ft., so that the landing stage is now upwards of half a mile in length. It has attained the greatest size possible to it for extension, southwards it is barred by the Pluckington Bank, whilst the cattle jetty, which forms part of the present addition, forbids any further developments to the northward. This jetty is a very substantial structure, like all Mersey Dock Board work. It is designed to deal with the Irish traffic. But indirectly it must benefit every trade, for it will free the landing stage proper from this mixed traffic, which is a difficult one to deal with, and will so give a great addition to the present means of dealing with purely passenger traffic of the ocean and coasting and excursion trades. The jetty, as its name implies, is a fixed structure built on piles and it is therefore unable to rise and fall, like the landing stage, with the strong Mersey tide. Being a fixture it is made incidentally strong enough to act as a kind of dolphin for the protection of the stages from similar collision with unmanageable vessels. But the difficulty of its immovability is met by the fact that it is constructed with three platforms or decks, one of which will be available under any tidal condition. There will be found every appliance for the cheap and rapid handling of passengers, baggage, cargo and cattle. The last item is, of course, a very important one in the Irish trade, and the animals will step almost direct from their steamer to their railway truck on the Riverside Railway. It is believed that the conveniences now given will be so valuable as to make it obviously advantageous to importers to deal with their cattle here in preference to sending them on to Manchester by through steamers up the canal. I have only one fault to find with the Dock Board on the completion of this two years' job. It is that they are making no fuss or display in connection with the opening. The public were not allowed on the extension one day, the next the barriers were removed. This is the Dock Board's way. It is a magnificent way, no doubt, but it is not the way of modern business, nor is it the way of rival ports. "Advertise, advertise, advertise!" is the cry to-day, and if there be anything still to be done after that it is "advertise again."

Messrs C. W. Kellock & Co.

have lost their senior partner since I last referred to them in these notes. This gentleman had, however, long since ceased to take any active part in the work of the firm whose management has long been, and still remains, in the hands of his son and Mr. Nelson Cameron. The firm has entered on its re-built offices in Water Street, Liverpool, during the present month of March, and the new premises are well worth a visit from those who are interested in the history of merchant shipping. One must regard such an office as that of Messrs. Kellock from a double point of view. The first and most important to its owners is naturally the convenience for the efficient and rapid conduct of their business, and for the comfort and attraction of those with whom they do business. In this regard it is sufficient to say that everything which long experience, careful insight into the working of their business and wise expenditure of money can do, has been done. The other point of view is that which affects us. It is the historical and artistic aspect. In these rooms—fitted out with handsome teak furniture and panelling from the yard of well known Mersey shipbuilders—will be seen much that is connected with the development of the science of shipbuilding. We have drawings, prints and oil pictures of many famous vessels of the old days. Amongst these may be instanced the Atlantic liner *Liverpool*, which sailed from the Mersey to New York in the same year as did the *Great Western* leave the Avon on her first trip to the westward, the famous Australian clipper ship *Red Jacket* of the White Star Line, which vessel in some sort is the ancestress of the leviathan building at Belfast. A vast number of models and half models adorn the walls. These include the *Banshee*, the paddle blockade runner of Mr. Taylor's book, and other vessels of historical interest The whole models include a very beautifully constructed Indiaman. The removal of the planking in this case shows the immense strength of her construction. Near by is a revolving chair which is now a common enough object of the passenger steamer's saloon. But this one is the first of the race. It came from the saloon of the first *Oceanic*, and before it was constructed, benches, with wooden backs were the most luxurious seats offered to the ocean traveller. Then there is the auctioneer's rostrum perched above a colossal half-length figure-head from a British man-of-war. This is protected by a fife rail of the orthodox style, and further interest attaches to it when we know that it came from the last constructed of old England's wooden walls. The private office has many treasures, amongst which I may mention certain quaint pieces of Liverpool pottery. These are connected with a very interesting and obselete custom. In the days when these vessels—which are chiefly jugs—were manufactured, the old pottery works at the Herculaneum dock were still flourishing, and ship launches were matters of rarer occurrence and of far greater interest than similar events are considered to-day, and so it was the custom to give everyone connected with the ship a permanent memorial of her start in life. The builders had a score or so of jugs or cups made at the pottery and distributed them amongst the persons who were interested in the adventure. These special jugs will be found to have on their sides, representation of the ship which caused their manufacture, as well as such further details as the owners' names and possibly the arms of the port. As a combination of a modern business house and a museum and picture gallery of the days that are gone, the new office of Messrs. Kellock is as unique as it is interesting.

The "Saint Pierre."

I mentioned a year or so ago in this column the very excellent plan of our French neighbours in fitting out and sending to sea a hospital ship for the benefit of their fisher-folk. I also told how, unfortunately, the little craft was lost before she had opportunity to do more than indicate the vast amount of good of which she was capable. The charitable and thoughtful people who equipped her were not to be discouraged by a mishap of this kind, and they promptly built a new vessel of the same name to succeed her. The launch took place on the 18th of March, and the vessel, which is commanded by Captain Rabin, was well forward at the time. It was hoped that early in April she would be ready to make her first cruise. On this occasion she is to confine her work to the English Channel. But I fancy that, like her predecessor, she will eventually find her way to the banks of Newfoundland, where there is a very large fleet of French vessels engaged in cod-fishing. Some of these vessels are barques of considerable tonnage, carrying a good many men, and as they are away from their home ports for considerable periods and are exposed beyond all other fishermen to the risks of collision, anything that can add to their comfort is worthy of the highest commendation.

Sensitive Southampton.

The peculiar form of self-consciousness and vanity which afflicts Southampton and those connected with its port has just had another illustration. It may be remembered that some two or three years ago, when the unfortunate North German Lloyd liner *Elbe* was sunk in the North Sea with great loss of life, the West India Royal Mail Company, or some person connected therewith, published a notice that it was not *their Elbe* that was lost. The notice was designed to quiet the fears of the relatives and friends of the crew and passengers of their ship, so it was said. But their excellent old ship *Elbe* was comfortably in dock at Southampton at the time and in no case could have been off Lowestoft. There were no passengers on board and the "crew" was probably a ship-keeper or so. But Southampton saw a chance of getting its name in print and that was enough. Now the Union Company—too big a concern, one would have thought, for such triviality—has published a notice that their steamship *Norman* is not missing. It appears that a North-East Coast steamer of small size, whose name is not even identical with hers (though it is true it is somewhat similar in sound), is overdue, and the opportunity to get a paragraph is not to be resisted.

The New Irish Mail Service.

The new boats were to be ready to commence the service in April. One or two of them have been on the station nearly six weeks. As far as can be learnt the vessels are all that can be desired. But until they actually begin to carry passengers and

perform their ordinary work it will be very difficult to arrive at any conclusion as to the extent to which they will exceed their guaranteed performance. That they will be up to it is warranted by the name of their builders. But this old established firm has a great horror of what it calls "reporters," and tries to exclude them altogether, furnishing the press with notices compiled by its own employés. Such notices, though apparently accepted, with all their well chosen epithets, by the daily press, are apt to be viewed with some doubt by those who know what trial trips are under ordinary circumstances and who appreciate the magnitude of the task set before the builders of these flyers. Trials would be absolutely unnecessary if there were never any hitches.

Not only may we expect to see a revolution in the sea part of the journey of Her Majesty's mails for Ireland, but we may also look for changes in their land transit. I called attention to the difference in the speed of the Irish Mail train and that of the August "racer" to Scotland in the autumn of last year. I showed how the third-class passenger was given a speed and convenience on his road to Scotland which was denied to passengers of even superior classes bound for Ireland, whilst the third-class passenger is altogether excluded from the Flying Irishman. It now appears that there will be acceleration of the Euston and Holyhead portion of the journey and that third-class passengers will now be carried by the mail. Considerable preparations are being made to cope with the increased traffic which reduced fares and larger facilities are expected to bring.

The Canadian Australian Royal Mail Steamship Company

has been formed to work the line between Vancouver and the British colonies in the far south. This line, as most readers are aware, was started by Mr. James Huddart some two or three years ago with a couple of modern steamers, and it has gone on with such success and so rapid a development that already a third vessel is on her way out to augment the sailings.

Meanwhile things do not move very rapidly towards the inauguration of the fast service on the Atlantic. The last report to hand is to the effect that an East Coast firm has successfully tendered to the Canadian Government for the twenty-knot service. The tender is said to be far lower than that of Messrs. Allan. The firm who are reported to have been successful have not, so far as I am aware, any experience in the working of a mail service and it may very well be that they do not know the demands which it makes upon both fleet and managers. These demands are of course well known to the firm which has been the pioneer in the Canadian Mail service and it might have been worth a little premium to secure their experience. That is worth something, and the absolutely lowest tender is not always the most satisfactory.

Now is the period of the year when we may expect the reports of Steamship companies. Some of them are of considerable interest. Thus, for example, we had that of the West India and Pacific Steamship Company, which owns now some 70,000 tons of steamers, one-fifth of which is absolutely new. Three-fifths more are of the most modern type of hull and engine, and the remaining fifth only has compound engines. Yet this most useful fleet, which has shown itself capable during the last year of earning a very big dividend, is valued in the company's books at a price far lower per ton than that of many a company whose old vessels are mere vehicles for the running up of expenses, and whose machinery is the cause of prematurely ageing its engineers.

The African Steamship Company, which is under the able management of Messrs. Elder, Dempster & Co., of Liverpool, pays a satisfactory dividend. As is probably well known to most readers, this company, in conjunction with the British and African Steam Navigation Company, which is under the same management, has a practical monopoly of the trade from British and Continental ports, to the West Coast of Africa. It has connections with various other companies, so that one cannot go through its fleet and say exactly how much tonnage it can show for its capital. But one sees a constant accession of new vessels suitable for its expanding trade, and a corresponding disappearance of the older type of vessel. In addition to its African fleet, this concern has a large fleet of general cargo vessels. Amongst these were some which were chartered to the Atlantic Transport Company. During the year just expired two of these were permanently taken over by their charterers. Then there are others which run in the Avonmouth service of the Dominion Line, and a third class engaged in the cotton trade. Amongst these last are the *Milwaukee*, which has just, on her maiden trip, brought the biggest cargo ever sent out from the port of New Orleans. Her capacity is said to be 28,000 bales of cotton. On this occasion she carried nearly 19,000 bales, besides a vast quantity of cotton seed, grain, copper, and staves. The whole deadweight shipped amounted to nearly 9,000 tons, exclusive of her coal. She has shown, however, that her size is quite as great as can trust to a single screw, and the new vessels now building for the line are to have duplicate machinery and twin screws.

The Pacific Steam Navigation Company

has had another disaster to its *Orotava*. It was only in the last issue of the MARINE ENGINEER that I was discussing the finding of the Board of Trade Inquiry into the circumstances surrounding this vessel's capsizing at Tilbury. At the time I wrote the vessel was again in trouble. She got safely as far as the Red Sea under her new commander, and then, at 10.30 p.m. on February 22nd, went ashore on a coral reef about 30 miles west of Perim. A correspondent of the *Times* alleges that in a run of 60 miles the vessel got as much as 18 miles out of her course. Be that as it may, she managed to get well on to the reef. If her luck in getting into trouble is phenomenal, she is equally remarkable for the way she gets out again. The coral did not apparently damage her skin. Boats were sent off to Perim and Assab, and assistance quickly fetched. H.M.S. *Cossack* was soon on the scene, as were tugs and lighters, and the telegraph-ship *Amber*. A feeling of security was thus given to her passengers, who after six days delay were taken by the P. & O. s.s. *Ganges* to Aden with their baggage. Some of them thence got the *Ballaarat*, which left London the week after they did, to take them on the road to Australia, and the remainder had to wait another week for the Orient Company's *Ophir*. I cannot quite understand how the damage, which the *Times* correspondent tells us was sustained by his own and his friend's baggage, took place. That and the delay will make them remember the *Orotava* for some time to come. Having lightered a good deal of cargo the vessel came off the reef and reached Perim on March 4th. Here she was surveyed and allowed to proceed. She reached Colombo on the same day as the succeeding steamer, the *Ophir*. No doubt another inquiry will follow, and it is well not to make too free comments on the matter till all the evidence is before us.

Disasters.

It would seem as though the year 1897 was to make itself a reputation of no enviable kind for the disasters which have taken place in its course. A Dutch steamer has been lost with all hands off Ushant in the month of March. The Compagnie Générale Transatlantique, usually free from serious trouble, has lost a large vessel on its new line from New York to the West Indies. This was the *Ville de S. Nazaire*, one of their older type of ship. She encountered a heavy gale in that region of storms off Cape Hatteras. The vessel made water so rapidly that the boats were the only resource of those on board. Yet the weather was so bad that only four of her complement of eight were successfully put in the water. Of these three were capsized, and the remaining one alone got away. She had some 38 souls on board. But it was seven days before assistance reached her, and her occupants were reduced to four when a schooner at last picked her up. As may be imagined, the condition of the survivors was pitiable and almost hopeless. It was at first believed that some 78 persons were thus lost. But on March 21st the *Kaiser Wilhelm II.*, of the North-German Lloyd Mediterranean service, reached New York with the news that she had spoken a vessel which was believed to have some 16 more survivors of the ill-fated *Ville de S. Nazaire* on board. This vessel is not due till March 31st, and so the fears and hopes of those interested in her passengers and crews are kept at the highest tension for some days still.

The terrible passages made by some of the Atlantic boats have been very noticeable. One Beaver liner—not a White Star boat as the *Times* and other papers alleged—was 25 days coming from St. John, New Brunswick, to Liverpool. She carried about 400 animals, including horses, cattle and sheep, and of these not one reached port. Some were killed by the seas; the majority had to be thrown overboard as there was no water for them. The vessel encountered bad weather and shipped so much water that her fires were extinguished. Moreover she took a heavy list. It is said that she owes her safety to the fact that her donkey-boiler was not on a level with the others, and that thus

when they were flooded out it was still capable of freeing the ship and enabling them to be got to work again. The Aberdeen liner *Lord Gough* was 27 days from Shields to St. John, and the Furness liner *Halifax City* 24 days from London to Halifax.

The Cunard Line.

From the Cunard Company I have received a framed and coloured lithograph of their Royal Mail steamer *Lucania* as she lies at her berth at the Liverpool landing-stage. The picture is a very good companion to that issued when the giant Cunarders first came out. This, it may be remembered, represented the difference of the ships of to-day and those with which Columbus discovered the New World. The present picture has the additional advantage of showing very clearly how real are the facilities now granted to passengers travelling by British lines to America. Liverpool now has train-to-boat conveniences as much as any other port, and the more this picture is circulated amongst the travelling public the better for British passenger lines.

"Why do Cunarders never wear out?" would be a good question for a debating society of young Naval architects. The *Samaria* was superseded long ago on the Boston Line and has recently been employed in the Mediterranean trade. Even there she is shortly to be replaced by more modern ships. Yet in her old age she successfully carries out a piece of salvage work of which a much younger craft might well be proud. Homeward bound from Gibraltar in the worst of the bad weather which characterized the month of March, 1897, she fell in with an iron ship, the *Schiffswerft*, of Flensburg, derelict in lat. 47·15 N. and long. 8 38 W. Captain Bacon determined to bring the vessel into safety, and so the chief officer and 16 men of the *Samaria* were put on board the sailer, for she needed a good crew, being a craft of only just under a thousand tons register. Three days towage was needed to bring the vessel into Queenstown, where she was left in safety, her rescuer proceeding for Liverpool. The *Schiffswerft* was bound from San Nicolas for Plymouth with a cargo of maize, when she was abandoned, and had lost a good deal of her top hamper as well as sustaining a good deal of injury to her decks through falling spars. No news of the crew has yet come to hand, but the fact that the instruments of navigation were still on board seems to point to a very hurried departure on the part of those in charge of her.

A Towage Accident

of a very serious kind has befallen the Johnston liner *Templemore*. She, like so many other liners, broke down in the Atlantic during the recent heavy weather. At last she was picked up by another of her owners' vessels and was towed for some days towards Liverpool without anything remarkable occurring. But suddenly the wire rope which connected the two vessels was carried away and the rebound caused serious and fatal damage. The captain and one man were killed on the spot and four others very seriously injured. We are accustomed to realize from previous accidents what havoc is wrought by the rebound of such powerful ropes broken under heavy strains, but for all that it would seem that the simple precaution of towing with the wire hawser fixed on to the chain cable of the following ship is not often adopted. The practice has enabled small vessels to make headway with much larger ships behind them, and it tends also to render towage much more steady and easy, for the weight of the chain acts as a spring or fly-wheel to absorb sudden shocks and strains in a seaway.

OBITUARY.

WILLIAM WILSON HULSE.

THE announcement of the death of Mr. William Wilson Hulse, which took place on March 20th at his residence, The Grove, Withington, near Manchester, in his 77th year, will be received with deep regret in engineering circles generally. Mr. Hulse had for some time past been in failing health, having practically withdrawn from active participation in business matters for the last six months, and an attack of apoplexy was the immediate cause of his death. Mr. Hulse had for nearly 50 years been prominently associated with the development of mechanical engineering in the Lancashire district, and for the last 16 years had the sole direction of the well-known engineering works of Messrs. Hulse & Co., Salford, which, under his control, have obtained a wide reputation for the production of high-class machine tools for marine requirements, a number of which have been illustrated and described in these columns. The following details of Mr. Hulse's career will, therefore, be specially interesting to our readers. Mr. Hulse was born June 19th, 1821, at Arnber, in Derbyshire, where his father was a cotton-spinner, and it was at the mechanics' shop in connection with the cotton-mill that he and his cousin, Mr.—afterwards Sir—Joseph Whitworth, first made acquaintance with engineering work. Mr. W. W. Hulse (as also his brother, Mr. J. S. Hulse) subsequently served his apprenticeship at the well-known Whitworth Works, established by his cousin in Chorlton Street, Manchester, ultimately becoming managing partner. There he devoted special attention to designing machine tools, and to the ordnance and small arms so prominently associated with the name of Whitworth. The partnership was dissolved on the firm' being converted into a limited liability

company, and Mr. Hulse commenced a professional career as consulting engineer at 88, King Street, Manchester. Mr. J. S. Hulse, who had established works in Ordsal, died in 1881, and Mr. W. W. Hulse then relinquished much of his consulting practice in order to take in hand his brother's business. It is due to his untiring energy and skill in designing that the Ordsal Works have been brought into the prominent position they occupy to-day. He took out many patents while associated with the Whitworth firm, and subsequently in connection with both ordnance and machine tools for general and marine requirements, and introduced the hollow form of framework now universally adopted in the manufacture of machine tools and other branches of engineering. Mr. Hulse became a member of the Institute of Mechanical Engineers in 1864, of the Institute of Civil Engineers in 1867, and was also a member of the Iron and Steel Institute. In 1867 he was appointed and acted as one of the British judges at the Philadelphia Exhibition, and also officiated in a similar capacity at several other important exhibitions. In 1886 he was invited to read a paper on modern machine tools before the Institute of Civil Engineers, in recognition of which he was awarded the Watt medal and Telford premium.

The Application of Wood-Carving to Ships' Decoration.—We regret that the block illustrating this article in our last issue should have turned out so badly, not giving our readers a fair idea of the fine edges, beautiful and artistic effect which can be produced by this process.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from February 24th, to March 26th, 1897:—

Allenby, John N., assistant engineer to the *Sans Pareil* (temporary), to date March 1st.

Allenby, John N., assistant engineer to the *Eclipse* (temporary), to date March 23rd.

Anderson, Arthur R., engineer to the *Vivid*, additional for the *Spider*, when commissioned, to date March 1st.

Andrew, George E., assistant engineer to the *Pelorus*, to date March 30th.

Atkins, Alfred E., engineer to the *Tribune*, additional for charge of stores and engines of torpedo-boats, to date March 23rd.

Bond, Edmund E., engineer to the *Pembroke*, additional for light-draught vessels building at Messrs. Thornycroft's and Yarrow's, to date March 8th.

Burnett, William C., chief engineer to the *Pelorus*, to date March 30th.

Cox, Frank S., assistant engineer to the *Medusa*, to date March 23rd.

Dowling, Horace E., (probationary) assistant engineer to the *Powerful*, to date March 1st.

Downer, John M., chief engineer to the *Tribune*, to date March 23rd.

Dunn, Charles F., engineer to the *Edgar*, when commissioned.

Ellis, Edgar H., engineer to the *Powerful*, for training school for students, to date March 1st.

Gibson-Sugars, J. S., engineer to the *Desperate*, to date March 23rd.

Haigh, Francis E. P., assistant engineer (temporary) to the *Bonaventure*, undated.

Harris, Herbert W., engineer to the *Melita*, to date March 16th.

Hocken, William T., chief engineer to the *Isis*, to date February 24th.

Huddy, Tom B., engineer to the *Vivid*, for training school for students, to date March 1st.

Johnson, John E., chief engineer to the *Undaunted*, to date March 23rd.

Meiklejohn, Harry J., engineer to the *Electra*, to date March 16th.

Odam, E. K., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Oram, H. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Parry, Reginald W., engineer to the *Anson*, to date February 26th.

Pattison, Alfred R., engineer to the *Rattlesnake*, to date March 19th.

Pibworth, William H., staff engineer to the *Eclipse*, to date March 23rd.

Pitt, C., fleet engineer to the *Victory*, for Portsmouth Dockyard, to date March 19th.

Rawlinson, W. W. H., chief engineer to the *Victory*, for Portsmouth Dockyard, to date March 19th.

Robertson, Gordon, assistant engineer to the *Sharpshooter*, to date March 1st.

Rowe, William, (probationary) assistant engineer to the *Undaunted*, to date March 23rd.

Sands, James, (probationary) assistant engineer to the *Eclipse*, to date March 23rd.

Shean, Charles C., engineer to the *Powerful*, for training school for students, to date March 1st.

Smith, D. E., fleet engineer to the *President*, for service at the Admiralty, to date March 19th.

Smith, Edgar C., assistant engineer (temporary) to the *Pembroke*, to date March 11th.

Stocker, Ernest, assistant engineer to the *Vivid*, supernumerary, to date March 3rd.

Stuart, Martin, chief engineer to the *Edgar*, when commissioned.

Turner, Thomas H., engineer to the *Eclipse*, to date March 23rd.

Venning, Thomas A., assistant engineer (temporary) to the *Undaunted*, undated.

Wallis, William A., engineer to the *Vivid*, additional for charge of stores and engines of torpedo-boats, to date March 23rd.

Williams, T., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

HOAR & BROWN'S HARDWOOD MARKET REPORT, MARCH 26th, 1897.

TEAK.—Business in Moulmein and Rangoon has been extremely quiet during the last four weeks, especially among landed stockholders, but the Bangkok floating market has proved more active, several cargoes being placed just lately at extremely good prices.

It is now the general opinion that Bangkok importations rank well with their competitors, and in time will reach equal value.

The stock of log stored at West India Docks is enough for present requirements.

Prices at port of shipment having been run up gradually to an increase of 30 to 40 per cent., has caused the consumption to fall off generally. Buyers are shy of taking more stock than is absolutely required for immediate use.

It is expected that supplies for the coming season will be light.

Planks have advanced in value in sympathy with the logs, and shippers are expecting to get a further rise upon later arrivals, but should this happen, the consumption will be greatly checked, and speculation become dangerous.

MAHOGANY—HONDURAS AND TOBASCO.—The imports have quite kept up with the demand, prices are fairly steady, good logs fetching full values, the minimum wood appeared in request, showing a trifling advance. CUBA.—stocks are getting very low, there are now only a few small logs obtainable, and prices have advanced considerably. AFRICAN.—This class has come much to the front lately, and small to medium sizes are making a better market, logs of large dimensions were already high, and prices have not benefited further. PANAMA.—Good parcels would be very acceptable, there is nothing of any account offering.

CEDAR.—Small consignments still continue to meet with willing buyers at full prices, and stocks are fairly light, with the exception of Paraguay, and in this there is little doing. The prices are exceptionally low, and it is surprising the cabinet trade are not more generally taking it up.

AMERICAN POPLAR.—Although some consumers in a large way have discontinued using this wood, the importations increase, and new markets open up, and the trade has become very large indeed.

AMERICAN WALNUT.—Owing to the quantity lately forced at public sale, the values have declined, especially for the second-class grades, but prime logs are holding their own and fetching even advanced figures.

AMERICAN LUMBER.—This branch is growing daily in magnitude, and has become an immense feature which causes the log trade to decrease, the good grades are still much required, and sales have shown well for importers, the second class also brings fair prices, but calls are not much in favour, except at exceptionally low figures.

KAWRIE PINE.—The stock has decreased, and prices remain firm, the enquiries are numerous, and the values are not likely to fall.

SEQUOIA.—Some further forced sales have taken place and quotations are lower, the stock is heavy for the poor consumption.

PADOUK.—Inferior "clear-up lots" were offered "without reserve," the result was a poor one. Nicely squared and good coloured logs are what is wanted, and still fetch the old figures.

GREENHEART.—Stocks are light, but the demand continues quiet, prices are weak.

The hardwood trade is inclined to be flat, and the prospect does not appear so favourable as in the year 1896.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE labour troubles which we referred to in our last issue, have been all through the month in a very unsettled state, but there is now every hope of the dispute being brought to a satisfactory conclusion. The threatened lock-out by the employers has exercised an unfavourable influence to trade in general The dispute is in itself a trifling one, arising from

a strike at the Sunderland Forge Co. against the employment of non-society men at machine work, and in another form at Barrow, where a strike has occurred in consequence of the attempt of the Amalgamated Society of Engineers to define the rate of wages to be paid at each machine, irrespective of the capacity or ability of the operator. It is upon this question that the Federated Employers of Scotland, Ireland, and the North of England deem it necessary to have a clear understanding. The feeling is general in the West of Scotland that sooner or later there is bound to be a great struggle between capital and labour with reference to the employment of what is called unskilled labour in the controlling of machinery and power tools.

In the early part of the month the Engineers Employers' Federation, after some correspondence had passed, wrote to the secretary of the A.S.E., stating that they were quite willing to meet in conference and consider the alleged grievances of the men, provided the strikers resumed work. Otherwise they would, they stated explicitly, be under the necessity of asking all the A.S.E. men in their employment to terminate their engagements. To this the Engineers' Executive replied that they would meet the employers on the terms suggested if the latter would stop the man to whom exception was taken pending the result of the conference. This, however, the employers absolutely declined to do, arguing that all that could be expected of them was that they should place things in exactly the same position as they were before the dispute. Some further correspondence passed but it was not until a proposal from the Federation of Shipbuilding and Engineering Trades offering in the interests of peace, to take the man off the machine for the time being, which was agreed to by the employers and the A.S.E. that a conference could be arranged. This is to be held in London on April 1st, meanwhile the lock-out notices, which were to have taken effect on March 27th, have been cancelled in all the districts. The man who was working the disputed machine at Sunderland has been withdrawn, and the engineers that are on strike are to resume work during negotiations.

It is understood that at the conference the Federation will have present two representatives from Belfast, three from the Clyde, one from Barrow, and three from the North-East Coast.

The effect of this improved outlook has been very marked here, where everyone foresaw a terrible struggle if once work should be stopped. Several fair shipbuilding contracts are reported to have been lately placed on the Clyde.

The sixth ordinary meeting of the West of Scotland Iron and Steel Institute was held on March 19th, Professor Sexton presiding. Discussion was continued on Mr. William Cuthill's paper on "Flow in Rolling of Steel," and Mr. E. L. Rhead's paper on "The Occurrence of Sulphur in Iron."

Messrs. The Ailsa Shipbuilding Co. have secured a contract for the building of a handsome steam yacht, from designs by Mr. G. L. Watson, Glasgow.

Messrs. Russell & Co., Port-Glasgow, have secured an order to build a cargo steamer capable of carrying about 7,000 tons deadweight for the Spanish firm, Messrs. Larrinaga. Messrs. Dunsmuir & Jackson, Govan, are reported to have the order for supplying the machinery.

Messrs. The Clydebank Engineering and Shipbuilding Co., Limited, have received an order for 20 barges of about 400 tons each for the Chinese Eastern Railway Co. They have also booked an order to build a large steamer for the Russian Volunteer Fleet. The vessel will be about 7,500 tons gross. She will be supplied with Belleville boilers.

Messrs. Carmichael, Maclean & Co., shipbuilders, Greenock, have contracted to build for Messrs. T. Albert Prompton & Co., a powerful twin-screw tug, to be 80 ft. in length, 18 ft. in breadth, and 9 ft. in depth. Messrs. Campbell & Calderwood, engineers, Paisley, are to supply the engines.

Messrs. Craig, Taylor & Co., Stockton-on-Tees, have secured an order from Messrs. Macbeth & Gray, Glasgow, for a steamer of about 5,000 tons deadweight.

Messrs. Mackie & Baxter, engineers, Glasgow, have received an order for a set of triple-expansion engines from Messrs. Turner & Co., Liverpool. These engines are for a steamer, the hull of which will be built south of the Tweed, and which will afterwards be taken to pieces for shipment abroad.

Messrs. J. G. Rowan & Co., Greenock, have obtained from the P. & O. Co. the order for supplying the upholstery furnishings of the two new mail and passenger steamers, *Egypt* and *Arabia*, building by Messrs. Caird & Co., Greenock.

Messrs. Chambers Brothers, boatbuilders, Greenock, have contracted to build six of their patent collapsible boats for a vessel at present being built by Messrs. Hawthorn, Leslie & Co., Newcastle-on-Tyne.

Messrs. Alley & MacLellan are to construct 10 barges for the Russian Government.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—At the time of writing the great shipbuilding and engineering centres of the north-east coast are agitated by the expectation of a coming struggle between the employers and the trade unions, which is likely to cast into insignificance all previous conflicts of the kind, and may possibly initiate a radical change in the future relations of masters and workmen. The imbroglio has been brought about by the interference of the Amalgamated Engineers' Society with the management of the Sunderland Forge and Engineering Co., Limited, this interference amounting practically to a denial of the right—claimed by the management—to put the charge of a certain machine in the hands of a workman of their own choosing. The employers in this instance proved the reverse of pliant, and the trade unionists, finding themselves worsted in their attempt to usurp authority, came out on strike—in other words, refused to serve if they could not also be permitted to command. Subsequently the Federation of Engineering Employers took the matter up, and the dispute has now reached proportions that are almost national in scope. The notices of a lock-out, involving one quarter of the men employed, have been posted on the Tyne, Wear, and Tees, and, it is also stated, on the Clyde. To this action the men—that is to say, the members of the Engineers' Society—have replied by intimating that the remaining three-quarters will cease work at the end of the current week. There are thus all the conditions present for the commencement of a fierce and possibly prolonged struggle, and it will be strange indeed if any means for a pacific solution are discovered. It is unfortunately a case in which it seems hardly possible for any satisfactory ending to be arrived at excepting by a trial of strength, and the submission of the weaker. For the sake of peace, the employers have allowed encroachment after encroachment to be made upon their undoubted right to control and direct the working of their own machinery and the men in their employment; until at the advent of the present year, almost the only sign of authority left them was the obligation to pay wages. They have come to see, however, that the trade of the country must ultimately be ruined if they do not make a stand against further aggression, and they have, apparently, resolved to make that stand. The workmen have to be protected against themselves, for if they had all their own way the conditions of productive work would be so hampered that England, instead of leading in the race of competition, would have to drop behind, and there would soon be nothing in the way of work to engage the attention of either employer or employed.

We do not think this struggle between the employers and the workmen is likely to be confined to the members of the one union named. They are not the only ones who have striven to unite the incongruous occupations of ordering and obeying. The members of almost every trade union have, to a greater or less extent, tried to arrogate to themselves a power which is not rightfully theirs, and it is time that a line was drawn beyond which they must not be permitted to pass. No one denies to workmen the right to make the best terms they can in regard to remuneration for their services; but when that is said, all is said. All sections of workmen have a common interest in the maintenance of a fair rate of wages, and so long as wages only constitutes a subject of dispute, there is not much fear of their interests clashing. Whenever any section of workmen, however, go beyond the question of mere wages, and try to take upon themselves the adjustment of other matters which do not justly come within the sphere of their action, they almost certainly become aggressors, not only against their employers, but against other sections of labour. To gratify the engineers in the present instance, it would be necessary to inflict a hardship upon the machine-men, who have just as good a right to live and breathe

as their more consequential brethren. This question of workmen's "rights," and employers' "prerogative," is one that urgently calls for settlement, and it will not be an irremediable calamity if, in the attempt to arrive at a definition which shall be satisfactory and permanent, even a cessation of work for a time should become necessary. We have not, and never have been, advocates or apologists of strikes; yet the evils arising from illegitimate trade unionist claims—put forward purely in a spirit of arbitrary selfishness—have become so intolerable that no extremity of misfortune could be so bad as their continuance.

No new orders for steamers have been reported lately, and it is now beginning to be admitted even by the most inveterate optimists, that trade—particularly that branch of it representing shipbuilding—is not bearing out the promise of the last three months of 1897. The oversea carrying trade has become further depressed since last month, and it would be idle to ignore the fact that a languid feeling appears to be settling down upon trade circles generally. Unrest in the ranks of labour is undoubtedly responsible to a large extent for this, but there are also other influences at work, among which must be reckoned the changed conditions resulting from improvements in productive appliances. The days of long periods of inflation and depression, alternating regularly a couple of times in each decade, seem to be passed, and the days of quickly-succeeding fluctuations—short and sharp—have come in their stead. This will doubtless be regarded, on the whole, as advantageous—at all events, it is a nearer approach to that condition of uniform and unchanging steadiness which, devoutly as it is wished for by some people, might not prove an unmixed blessing were it possible of attainment. The sectional strike of smiths at the Elswick yard appears to be on the eve of settlement, and it is probable that the men will be at work before this is in print. The strike arose out of a wages claim, but was continued after the settlement of the latter, because the responsible officials of the Elswick establishment had declined to discharge a number of smiths connected with another trade union who had kept at work. It seems now as if those who had been on strike are disposed to abandon their claim for the discharge of the others, as the management can give employment to those who were on strike and to those who remained at work, and more if they could get them. The Elswick firm are really overburdened with work, and in view of this it is gratifying that their managers had the courage to stand by the men who were loyal, and not allow themselves to be driven into doing an act of gross injustice by a few malcontents.

Active progress is being made with the construction of the battleships, cruisers, and torpedo destroyers that are on the stocks, and wherever it is possible night work is being continued. At the firm's Low Walker yard the launch of a Norwegian cruiser has left a berth vacant, but it is probable that this will shortly be occupied with a mercantile steamer of a special and superior class.

Messrs. W. Dobson & Co., and Messrs. Wood & Skinner, have their building berths fully engaged, and in both cases work is likely to continue fairly active till the autumn. Messrs. C. S. Swan & Hunter have put down in their pontoon yard some very powerful hydraulic machinery, which must materially help to cheapen the cost of production. By the aid of these machines work can be done most expeditiously, and almost independently of hand labour; not to speak of the attainment of greater accuracy, which is perhaps a still more important consideration.

Messrs. Robert Stephenson & Co., having definitely arranged to build a large floating dock for the Spanish authorities, are now receiving large quantities of materials in their yard at Hebburn, where considerable activity is likely to exist during the remainder of the year. The dimensions of the dock when completed will be: length, 450 ft.; width, 117 ft.; and depth, 38 ft. 6 ins. The dock will rest on six iron pontoons, which when necessary (for repairs or other purpose) can be temporarily detached from the structure and floated on to the dock itself. This will prove a great advantage, as the pontoons —which, of course, are always more or less submerged—can be kept, without difficulty, in a thoroughly serviceable condition. The dock will be capable of lifting vessels up to 12,000 tons, and the pumping machinery is equal to the displacement of 12,000 tons of water every two hours. A peculiar feature in the design of the dock is that stability, or bearing capacity, is so distributed as to admit of the maximum weight (12,000 tons) being borne upon two-thirds of its total length. Thus, a war vessel of the weight mentioned, though no more than 300 ft. in length, might remain upon the dock for even a prolonged period without causing the slightest deflection from the original lines upon which the structure was planned. The dock will be sent out to Olongapo, in the Philippine Islands, in sections, to be completed and permanently located there. Messrs. R. Stephenson & Co. have for some years past made a speciality of this kind of work, and the machinery equipment and general arrangements of their establishment are such as to pre-eminently qualify them for executing contracts expeditiously and cheaply, besides giving sound and reliable work.

The Palmers' Shipbuilding and Iron Co., Limited, have achieved further triumphs in the trials of torpedo destroyers recently launched by them, and it is confidently anticipated that the cruisers which the firm are building for the Admiralty will also be found satisfactory when subjected to the customary tests. In their new departure of cycle manufacture, the firm have achieved an undoubted success, and the products of their factory are greatly admired for their strength and beauty of finish. The Palmer Cycle is already in great demand, and we understand that the Jarrow factory is kept exceedingly busy.

The Tyne Shipbuilding Co. having found it necessary, in consequence of the growing liking for largeness of dimensions in ships, to reduce the number of their building berths from four to three, have all of these occupied, and are in a position to keep a full complement of hands engaged. It is probable, indeed, that as much work can be done with three berths as with four, assuming, of course, that orders are plentiful and that the management is astute enough to keep the building of vessels so arranged that the three stages of keel laying, framing, and finishing, shall always be going on simultaneously. At Messrs. Readhead's establishment business is extremely active, and at some of the smaller yards orders for fishing-vessels have been recently booked. Most of the dock-owning firms are busy, the Smiths' Dock Co., of North Shields, being particularly well employed. Messrs. Hawthorn, Leslie, & Co. are still busy on the repairing of the Russian volunteer steamer *Orel*. It is stated that the firm have received an order from the Volunteer Syndicate for a vessel of small dimensions.

Engineering.—There is very little to be added to what has already been stated in reference to engineering matters, excepting that all the leading establishments are very full of work. An order of more than common interest has been received at the Wallsend Slipway and Engineering Co.'s works, where important extensions are being made and new plant being put down. The order to which reference is made is for the engines and boilers of a torpedo destroyer building at the Elswick Works, and is regarded as an earnest of many more to follow. The impression exists, indeed, that a very large proportion, if not all the war vessels that may henceforward be built in the yards of Messrs. Armstrong, Whitworth, & Co., will be fitted with machinery at the Wallsend Slipway Works. This, of course, will be an immense advantage to the district, as hitherto the engines and boilers for war vessels built at Elswick have been supplied from places at a distance.

Messrs. Donkin & Co. (late Donkin & Nichol), of the St. Andrew's Engine Works, Newcastle, are still extremely busy in the manufacture of steering gears, ash-hoists, engine-room telegraphs, &c. The ash-hoists made by this firm are noted for their simplicity of design and effectiveness in work. It may be added that most of those now on order are for vessels of large tonnage that are intended for special services.

Great pressure of activity exists at Messrs. Spencer's works, Newburn; and both iron and brass foundries throughout the district continue to be kept busy.

THE WEAR.

Shipbuilding.—It has not transpired that any new orders (excepting one for a comparatively small vessel by Messrs. Austin) have been booked by Wearside builders during the month, but the majority have enough in hand to keep them busy over the summer months. Below bridge the busiest yard is that of Messrs. J. L. Thompson & Sons, where five large vessels are in course of construction, and large quantities of material are being received daily.

Above bridge the three establishments of Sir James Laing, Messrs. Doxford, and Messrs. Short Bros. are exceedingly busy, the aggregate tonnage building at those yards (exclusive of Messrs. Doxford's torpedo destroyers) being not less than 70,000 tons. The fine steamer *Clan Macdonald* was launched by

Messrs. Doxford early in the month, and three others, all of the "turret" type, and of equal dimensions, are in active progress on the stocks. The whole of these splendid cargo boats will be fitted with bronze propellers, and will in other respects be equipped in a complete and effective manner, the machinery in each case being supplied by the builders. Every effort is being made at Messrs. Short Brothers' yard to accelerate the execution of contracts, and should the weather prove ordinarily favourable there is every reason to expect the realisation of a record output—for this establishment—in the current year.

Messrs. Osborne & Graham are understood to have but a limited amount of work in hand, and Messrs. Pickersgill have but one vessel on the stocks. Messrs. Priestman and Messrs. R. Thompson & Sons, however, are both fairly well off for work.

Engineering.—The larger engineering works continue busy, but in view of prospective complications with the Engineers' Society, the employers can scarcely be free from anxiety. It is, to say the least, hard that when masters have worked and worried to get orders whereby their machinery might be kept going and their workmen kept in employment, the latter should see fit to cause trouble and obstruction for which there is no occasion. Under existing circumstances the masters dare not take orders if there were any on offer, and it is as well, perhaps, that there are none at the present juncture. The only order reported this month is one for a set of small triple-expansions, which has come to Messrs. MacColl & Pollock, and is intended for a vessel to be built at Middlesbrough. The Bloomfield Engine Works (Mr. A. A. Rickaby) show a very satisfactory state of business, the demand for the firm's specialities being well maintained. Recent negotiations have resulted in the decision to withdraw, without prejudice, from the disputed work at the Pallion Forge the men engaged on it, so as to clear the way for a conference between the masters and the representatives of the Engineers' Society.

A statement which appeared recently in a monthly contemporary, to the effect that the Tyne authorities were about to follow the example of the Wear Commissioners in forbidding facilities for the bunkering of large steamers at their drops, appears to have no meaning. Nothing of the kind has been done or thought of on the Wear, and there is no reason to expect that any prohibition of the kind will be made upon the Tyne.

The Hartlepools.—All the yards at this centre are now busy, many of the vessels in course of construction being of exceptionally large size. Messrs. Thomas Richardson & Sons fitted the s.s. *Verona*, built by Messrs. Short Bros., Sunderland, for Messrs. Gow, Harrison & Co., Glasgow, with her machinery early in the month, and the vessel had a successful trial on the 5th, a mean speed of 12 knots being obtained on a series of runs over the measured mile. The engines are triple-expansion, and the two steel boilers are constructed to work at a pressure of 180 lbs. We hope in an early issue to be able to give particulars of the electrical plant at Messrs. Richardson's works.

Stockton.—Messrs. Craig, Taylor & Co. are reported to have booked an order for a vessel of large size for Glasgow owners, and Messrs. Ropner & Sons are also said to have received an important order.

Messrs. Blair & Co. have just fitted with engines, &c., a large vessel built on the Wear for Greek owners.

Messrs. Riley Bros., engineers and boiler-makers, have a large amount of work on hand, among the orders being one for 14 marine-type donkey boilers from a Sunderland shipbuilding firm.

Middlesbrough.—Messrs. Craggs & Sons are reported to have booked some orders lately, among them being one for a vessel of 3,000 tons carrying capacity. Messrs. Raylton Dixon & Co. are well provided with work, and at Messrs. Harkess & Co.'s yard there is some repair work in hand. At the docks trade is dull, but steel works and iron foundries are extremely busy.

Consett.—The steel millmen at the Consett Iron Co.'s works have, under a sliding-scale arrangement, been awarded an advance of 2½ per cent. on their wages, the advance to come into effect on April 1st, and be continued until June 30th in the present year.

Messrs. Armstrong, Whitworth & Co.—The amalgamation of the great firms of Sir W. G. Armstrong & Co., of Newcastle-on-Tyne, and Messrs. Sir Joseph Whitworth & Co., of Manchester, has been definitely completed, and the combined firms are now known as "Messrs. Armstrong, Whitworth & Co.," of Newcastle-on-Tyne and Manchester. A profit sharing scheme by which the employés may become participators, in a more direct sense than at present in the business of the company, has been submitted to the various departments, and is understood to have been received with favour.

THE MERSEY.

(From our own Correspondent.)

THE outlook in the engineering and iron trades of this district is scarcely so satisfactory as it has been of late, the serious labour disputes now pending, and the continued unsettled position abroad exercising a depressing effect upon industrial and business operations. In the engineering trades establishments are still kept fully employed upon orders in hand, but there is an absence of new work of any great weight coming forward to replace contracts that are at present keeping firms going. Machine tool-makers have, however, still quite enough work on their books to carry them forward for some time to come. Stationary engine builders are also well engaged both in the light and heavy departments, and boiler-makers are as a rule well supplied with orders, whilst in the locomotive building trade there is a good deal of work stirring. In some of the heavy engineering branches, however, work for India is at present suspended, owing to the plague, which prevents the delivery of work into that country, and the machine making trades report, in some departments, a slackening off as regards orders coming to hand. During the month a dispute has again broken out in the Oldham district, and the arrangement by which an advance of 2s. per week was given to the weekly-wage men appears to have fallen through on the question of an advance demanded for piece-work and other points since raised, with the result that a large number of men have been thrown on the books.

The usual monthly returns of the principal trades union societies connected with the engineering industries indicate a continued satisfactory position so far as activity in trade is concerned, although the outlook as regards labour and wages questions is scarcely so promising. The Amalgamated Society of Engineers has now 2½ per cent. of its total membership on donation, which represents a small increase upon last month's returns, but this is due entirely to strikes and lock-outs in various parts of the kingdom, and apart from these the returns would have shown a considerable decrease in the unemployed list. In this immediate district there are only 1¾ per cent. on support, and the number would be still lower but for the temporary depression in some of the machine making trades. In the Steam Engine Makers' Society there are not more than ¾ per cent. on donation. The reports as to the state of trade continue of a very favourable character. Activity is fully maintained in practically all the leading engineering centres, and it is exceptional where trade is not returned as either good or moderate. The only disturbing element in the present situation is the unrest which prevails as regards labour and wages matters, and which has found expression in the various disputes now pending in several important industrial districts.

With regard to the shipbuilding trade, yards are just now well engaged upon orders in hand. From the half-yearly circular of a well-known firm of contractors, it appears that there has been quite a rush to buy or build new tonnage during the last six months, about 250,000 tons extra of new steamers having been ordered during this "boom." The builders have of course benefited by getting these orders, and most of the yards are at present very busy, but the majority of the new steamers were placed at low figures. A considerable number of the steamers now on the stocks are large, high-class cargo boats for the regular lines and companies, and the competition of this type of vessels is a serious matter for the owners of "tramp" steamers.

The Schiele Union Engineering Co., Limited, Pollard Street, Manchester, have recently brought out an improved patent portable hand-driven fan, which will be found specially serviceable for ships' requirements, for clearing foul air from stoke-holes, &c., and for numerous other purposes where forced draught is required. This fan has a strong wrought-iron casing and a steel plate disc, whilst the base plate and standards are also of steel, so that the apparatus is practically unbreakable,

there being no parts liable to fracture. The driving is by chain gear, which is noiseless, efficient, and very easy to work, which is a much preferable arrangement to the ordinary tooth-gear driven fans, which are very objectionable on account of the noise produced when in operation, and the liability to breakage. The arrangement is very compact in construction, the diameter of revolving disc ranging from 14 in. to 24 in., and the total weight of the fan from 2 cwt. to 4 cwt.; and the base plate is fitted with wheels, so that the fan can be readily moved about from one place to another on board ship. The company also make a fan with cast iron casing and cast steel disc, which they supply at a lower price, but for ship requirements the wrought-iron-cased fan will be found more suitable.

A new machine is being put upon the market by Messrs. Richmond & Chandler, Manchester, for cutting up raw rubber into slices. In this machine there are a number of circular cutters with sharp edges, which revolve through the rubber as it is fed to them, and carry it through in slices, which are combed out underneath, where they are discharged. The cutters can be placed at various distances according to thickness of cut required, and the machine can be easily worked by two men. These machines are specially adapted for use in countries where the rubber is grown, and has to be got into a state by which the moisture can be exuded, before being ready for shipment. The same firm are also introducing an improved friction hoist, in which the friction is obtained by a belt and pulleys, which they claim to be an advantage over the usual style of two pulleys working together, inasmuch as the grip is considerably greater, whilst there is less wear and tear, and no risk of firing. The hoisting, lowering, and breaking are actuated by means of a hand cord, and the whole arrangement is so simple that anyone can work it with safety.

We have previously referred to the series of gas muffle furnaces introduced by Messrs. Fletcher, Russell & Co., Limited, of Warrington, Manchester, and London, and it may be interesting to note that the firm have since that time carried out further improvements with a view of securing perfectly even heat throughout the furnace. In the improved furnace the heat is obtained from a series of Bunsen burners, each of which is under separate control, instead of from one large burner as previously, and by this arrangement not only is the heat distributed evenly, but the temperature can be regulated with nicety according to requirements. These furnaces are now being supplied to most of the Government Assay Offices, as well as to private firms. Messrs. Fletcher, Russell & Co. have also a speciality in crucible furnaces, in which the crucible is surrounded by a cylinder, between which and the crucible the gas flame passes, and is then driven down outside the cylinder to the exhaust low down in the casing. By this arrangement all the heat is utilised, and the furnaces have proved very successful in operation where they have been adopted.

In the iron trade here there has been a continued slackening off as regard business coming forward, with a further downward tendency in prices, during the past month. In pig-iron the demand has been of the slowest possible character, and although makers for the most part have not given way in their quoted rates to any very material extent, merchants have been competing for what little business there has been offering, at prices considerably below makers' nominal quotations. Lancashire makers still hold to recent rates, averaging 47s. to 47s. 6d. for forge, to 48s. 6d. for foundry, less 2½ delivered Manchester, but they are practically out of the market where they come into competition with other brands. District brands are quoted by makers about 43s. 6d. to 44s. for forge to 45s. 6d. for foundry, Lincolnshire, and 49s. to 49s. 6d. for foundry, Derbyshire, net, delivered Manchester, which represents a giving way of about 6d. per ton on last month's rates, whilst merchants are underselling. Outside brands have shown a decided weakening tendency, and are obtainable at 6d. to 1s. below late quotations, good foundry Middlesbrough ranging from about 48s. 10d. to 49s. 6d. net, delivered by rail Manchester, and about 48s. Manchester Docks; with Eglington and Glengarnock about 47s. 3d. to 47s. 9d., delivered Lancashire ports, and 49s. 6d. to 50s. Manchester Docks; whilst American pig, of which considerable supplies have been offering during the month, can be bought at 46s. 6d. to 47s. net, delivered Manchester Docks.

Finished iron makers are booking very little new business, but, being well engaged on orders in hand, they still hold to ate rates, of £6 for Lancashire, and £6 5s. for North Staffordshire bars, delivered Manchester district, but merchants would be prepared to sell at 2s. 6d. under these figures. Sheets have eased down somewhat, and now do not average more than £7 5s. to £7 7s. 6d., but hoops, although in slow demand, remain at £6 10s. for random to £6 15s. for special cut lengths delivered Manchester district, and 2s. 6d. less for shipment.

Business in the steel trade is very quiet with a weak tone in prices. Hematites are now readily obtainable at 59s. to 60s. less 2½, delivered Manchester, with local makers of steel billets, who have to meet a keen American competition, finding it difficult to get £4 10s. net cash. Local steel bars average about £6 2s. 6d., and boiler plates £6 10s. to £6 12s. 6d., but plates from other districts are offered at £6 5s. to £6 7s. 6d. delivered here.

In the metal market manufacturers have been very busy during the past month, with new work coming forward freely. List rates are without alteration, but makers have been asking special advances upon these, where quick delivery is required. Delivered Manchester district list rates remain as under:—solid drawn brass boiler tubes, 7¼d.; solid drawn brass surface condenser tubes, 8¾d.; solid drawn copper tubes, 8¼d.; brazed copper gas and steam tubes, 8½d.; brazed brass gas tube, 8d.; brass wire, 6½d.; copper wire, 7½d.; rolled brass, 6½d.; and sheet brass, 7½d. per lb.

In the timber trade there has been a steady demand, and prices are generally firm, with stocks moderate. A large business has been done on contract for next season at firm rates. The demand for East India teak is active, with prices advancing, and stock within reasonable limits. There has been no import of greenheart, but the stock is sufficient for the time of the year, and prices are unchanged.

Business in the coal trade has moved on but slowly. Pits are still working about five days per week, but the output is in many cases in excess of the demand, and stocks are accumulating at some of the collieries. House coals are in but moderate request, and although colliery owners have made no material change in their list prices, they would be prepared to make some concession on these to move away surplus quantities. Steam and forge coals meet with a fair enquiry, but supplies are plentiful, and prices weak. Engine fuel is also offering in excess of the demand but there is more business doing, and generally late rates are fairly well maintained. At the pitmouth best Wigan Arley averages 10s. to 10s. 6d.; Pemberton four-foot and seconds Arley, 8s. to 8s. 6d.; common house coal, 7s. to 7s. 6d.; steam and forge coal, 5s. 9d. to 6s.; engine fuel, 3s. to 3s. 6d. for common, 3s. 9d. to 4s. 3d. for medium sorts, and 4s. 6d. to 4s. 9d. for best qualities.

In the shipping trade there has been only a limited business doing, with low prices ruling, ordinary steam coal not averaging more than 7s. 6d. to 7s. 9d. delivered at the Lancashire ports.

During the past month Messrs. Laird Bros. have made several very successful trials of vessels which they have built. The first class battle-ship *Mars* completed her 30 hours' coal consumption trial in the English Channel on the 16th March, and anchored at Spithead. The draught-water was 24 ft. 2 in. forward, and 26 in. aft, and the steam in the boilers 139·4 lbs., the vacuum being 46·4 in starboard and 26·3 in port, with 83·74 revolutions starboard and 83·44 port. The engines worked up to 6,028 H.P., giving the ship by patent log a speed of 14·4 knots. Two days later the vessel left Spithead on her 8-hours' natural draught trial. The draught of the water forward was 24 ft. and aft 26 ft., the steam in the boilers was 149·8 lbs., the vacuum 26·2 in. starboard, and 26·6 port. The revolutions per minute were 97·57 starboard and 98·4 port, and collective I.H.P. 10,159, which was produced with a mean air-pressure of 0·21 in., giving the ship a speed by patent log of 15·96 knots. On the 19th March the *Mars* took her four-hours' forced draught trial, in which the draught of water was 24 ft. forward and 26 ft. aft, the steam in boilers 146·5 lbs., whilst the vacuum was 26·5 in. starboard and 26·7 port. The mean air-pressure was 0·78 in., the collective H.P. 12,434, with 103·9 revolutions starboard and 104·5 port. The steam as recorded by patent log was 17·7 knots. The H.P. exceeds the contract by 434 H.P. Earlier in the month the *Seal*, the ninth of the ten 30-knot torpedo boat destroyers on order for the Admiralty, was launched. The *Sparrowhawk* has been delivered at Devonport, and has passed all her trials, and three others have completed their speed trials. The torpedo gun-boat, *Almirante Simpson*, built for the Chilian Government, has arrived safely at Genoa,

everything working satisfactorily. The *Leinster*, the second of the Dublin mail packets built by the firm, has passed through a very satisfactory trial trip, and has broken the Channel record, the voyage from Kingstown breakwater to Holyhead breakwater being accomplished in 2 hours 24 minutes, and from Kingstown pier to Holyhead pier in 2 hours 30 minutes. The distance from the Kish to Holyhead breakwater was done in 2 hours 10 seconds, at an average speed of 23·9 knots per hour, a speed never equalled by any passenger vessel before.

BELFAST TRADE NOTES.

(*From our own Correspondent.*)

THE same busy state of trade as reported last month still continues in shipbuilding and engineering here, and if all reports circulated be true, Messrs. Harland & Wolff, Limited, are credited with having booked orders for another two steamers of large dimensions for the Hamburg-American Co., it is stated of larger tonnage than the s.s. *Arabia*, which vessel left the Abercorn Basin on the morning of the 6th inst., and proceeded down the Belfast Lough on her trial trip and to adjust compasses. The vessel is of the following dimensions:—400 ft. long; 49 ft. broad; 30 ft. 3 in. deep; and her gross tonnage is about 5,450. She will be propelled by a set of quadruple-expansion engines, specially designed to avoid vibration, similar to those of the s.s. *Pennsylvania*, which recently left this port for the same owners. The steamer has accommodation for a few first-class passengers, and 300 steerage passengers. She is fitted with every mechanical facility for the rapid loading and discharging of cargo, also with refrigerating machinery and a complete installation of electric light. The saloon and other rooms have been suitably decorated in teak and oak. The *Arabia* is intended to run in the company's North Atlantic trade, and is built to the highest class of Germanischer Lloyd's, and is under command of Captain Pietsch, one of the oldest servants of the Hamburg Line. The trial trip was in every way satisfactory, and the vessel left for her destination.

The large steamer belonging to the Hamburg Line, *Augusta Victoria*, which was recently cut in two and lengthened, has again been taken out of dry dock and floated. She looks a much more handsome vessel than formerly, and if once completed and finished in the firm's style, she will no doubt prove herself worthy of all the money spent in her improvement. She will be completed next month.

The work is progressing rapidly on the White Star *Greyhound*. Hydraulic lifting gear is being erected alongside the slip where keel is laid, and material of every description coming into yard in connection with this vessel. It may not be out of place to ask who was really the inventor of the triple-expansion engine. The following will show who claims to be the man:—

Mr. W. L. G. Wright, of Glasgow, who claims to have invented the triple-expansion engine, recently wrote to Messrs. Harland & Wolff: "With regard to your new contract to build the largest vessel in the world, I make the following offer: I am open to excel any engine of any type or form if you go by my plans. I can construct two pairs of compound engines in No. 1 cylinder. In some cases this cylinder has three parts with a slide valve of a different make to suit, which can drive two propellers or a single propeller before the steam passes into the second cylinder. It forms its own vacuum, and pumps its own air and water independent of any pump. It acts, then, the same as our triple-expansion engine (which I invented). I have invented these engines to excel my triple-expansion engines, which are now in use in almost every steamer afloat." Mr. Wright offered to meet a representative of the firm in Glasgow and show him the plans, but Messrs. Harland & Wolff have sent the following reply: "Dear Sir,—We are in receipt of your favour of yesterday's date, but in so far as all our arrangements are practically completed in connection with the matter referred to, we regret that we are unable to entertain your proposal."

Two steamers will be launched on the 23rd inst. by Messrs. Workman, Clark & Co.—one from their north yard and one from their south yard. Particulars of these vessels will be given next month.

We might here mention that the engine works of this firm, which were recently destroyed by the disastrous fire, have all been rebuilt of iron, and are now again in full swing, with the addition of improved tools and appliances. There is also a very extensive electric plant being laid down, by which all the machines will ultimately be driven, part of this system being already at work. It is said that when completed this will be the largest electric plant for driving purposes owned by any one firm throughout Great Britain.

A new twin-screw tug, built for the Belfast Harbour Commissioners, has been launched from the yard of Messrs. Scott & Sons, Bowling. This tug has been built to the order of Messrs. Mc Coll & Co., Belfast, who will supply the engines. These will be of 1,000 H.P., the boiler having forced draught. The dimensions of this tug, which was named the *Musgrave*, are 122 ft. long by 24 ft. 6 in. broad. When complete the *Musgrave* will doubtless prove an immense acquisition to the port of Belfast.

Considering the vast amount of both engineering and shipbuilding trade on hand in Belfast at present, it is with great regret we have to allude to the possibility of another lock-out of engineers owing to some dispute between the Amalgamated Society of Engineers and the Employers' Federation. This, however, may not be so disastrous as at first anticipated, as while we write a report is current that both Messrs. Harland & Wolff, Limited, and Victor Coates & Co., Limited, do not intend putting up lock-out notices. If this be true, it is possible that some amicable arrangement may be made between the A.S.E. and the Employers' Federation which will terminate the dispute.

NORTH-WEST OF ENGLAND.

(*From our own Correspondent.*)

Barrow-in-Furness.—There has been no change during the month in the condition or position of the shipbuilding or engineering trades of this district. A steady routine of work has been observable all round, and builders have progressed very much with the orders they have in hand. The demand for new commercial tonnage is comparatively easy, but builders in the meantime are busy on old orders, and the activity at local yards is well maintained, although it is quite evident that before long new orders will be necessary to ensure a continuance of the activity so long enjoyed at local yards. The prospects for the future, however, are fairly bright as the shipping trades are well employed, and builders have their hands fairly well filled in the meantime. The difficulty, however, is one mainly as regards prices, and certainly competition for orders is so keen that nothing but low rates can be expected. The Admiralty work in hand is of a fairly comprehensive character, as new ships have only recently been commenced, and others are approaching towards completion; but the unfortunate circumstance of the present position is the new Admiralty work is not being given out on a large scale to private builders nor are foreign orders for warships plentiful, or even in evidence. The hope generally entertained at Barrow on the belief that Messrs. Vickers, Sons & Co., Limited, intend to complete warships ready for active service fully equipped by themselves as regards armour, guns, shipbuilding and engineeering, is that a scheme of shipbuilding development will follow such as has marked the progress and experience of the Elswick yard. There can be no doubt about it that Barrow affords scope for the building of high-class warships, and what has been hitherto wanted has been capital and enterprise, and these have been secured in the purchase of the Barrow yard by Messrs. Vickers, Sons & Co., Limited. It is anticipated first of all that the fact that the new owners of the Barrow yard are producers of their own armour-plates and guns will put them in a front-rank position for the delivery of fully-equipped ships at prices which will command orders. There is the further prospect of securing trade by the building of various types of warships likely to command purchasers before they are ready for delivery. The *Niobe*, which is receiving her boilers and engines in the Devonshire Dock, is progressing very rapidly towards completion, and it is anticipated she will be fairly well ready for delivery by the autumn of the present year. Already her two masts have been stepped, and some of her boilers as well as the heavy bedplates of her engines have been fixed in position. The *Amphitrite*, practically a sister ship to the *Niobe*, is proceeding well in her framing. All the four torpedo-boat destroyers have now been launched, and are in various stages of completion. In the course of a few weeks one or two of them, the *Avon*

and the *Bittern*, will proceed on official and builders' trials. The *Duchess of Devonshire*, the twin-screw Channel steamer, built at Barrow for the Barrow and Belfast and the Barrow and Isle of Man services, has been completed and is now undergoing her trials. The s.s. *Roebuck*, twin-screw steamer for the Great Western Co. for the Channel service, has been launched and is being rapidly completed, while her sister ship, the *Reindeer*, will be launched in the middle of April. The keel has been laid of the new twin-screw steamer for the Fleetwood and Belfast service. She is to be five feet longer than the *Duke of Lancaster*, and the extra space will be utilised in her engine and boiler rooms with a view of giving her greater power and speed. The only other job the Barrow Co. has on hand in the shipbuilding part of their yard is the sludge boat of 1,000 tons for the Manchester Corporation, for use on the Ship Canal, with a view of conveying the sewage of Cottonopolis to the sea in the same way as is done by the County Council on the Thames. In fact, the Manchester ship is practically a replica of those now doing such good work on the Thames. The engineering department of the Barrow yard has been very busy, but the work in hand has been largely completed, and new orders would be acceptable. Some labour difficulties have arisen which it is expected will be settled by the conference to be convened by the Employers' Federation and the Amalgamated Society of Engineers. Fear was entertained that the difficulties experienced would lead to the closing of the works for some time, but happily the prospect is at an end. When the *Duchess of Devonshire* was ready to proceed on her trial trip on Monday, the 22nd inst., the engineers told off to do the usual duty in the engine-room refused, and a scratch crew of engineers made up of apprentices and engineering draughtsmen were told off to do the work. The members of the Amalgamated Society took this action because the masters, having given notice of a lock-out, the central executive of the Engineers replied that no men should in the meantime work overtime. As on a trial trip night and day work is essential, the men refused duty, and now it is a condition for the holding of the conference that these men who were discharged shall be re-engaged. Prospects happily point to an early settlement of the difficulty, as both from a master's and a men's point of view a labour quarrel at present would be a very disastrous event.

Miscellaneous.

The Worthington Pumping Engine Co.—The well-known steam and electric pumping engine makers, report that their New York house has recently received a contract from the Newport News Shipbuilding and Dry Dock Co. for all the pumps for the U.S. battleships *Kearsage*, *Kentucky*, and *Illinois*, including also the steam accumulators and hydraulic pressure pumps for working the turrets and gun carriages. They also received the contract for all the pumps and pumping machinery for the U.S. battleship *Alabama*, which is now being constructed by the William Cramp & Sons' Ship and Engine Building Co. of Philadelphia. In addition to the above they have just completed and delivered the hydraulic machinery for operating the turrets of the U.S. battleship *Iowa*. Their New York house has also recently received a contract covering the pumps required for the armoured cruiser now being built for the Japanese Government by the William Cramp & Sons Ship and Engine Building Co. The Japanese cruiser *Yoshi-No*, which was built in 1893, by Sir William Armstrong, Mitchell & Co., at their Elswick Works, and engined by Messrs. Humphrys, Tennant & Co., Deptford, London, was also fitted out with a full complement of Worthington pumps, and it was due to the satisfactory results obtained with these pumps that the Japanese authorities decided upon using Worthington pumps in the new cruiser now being built in America. The fact that so many British and other foreign war vessels are equipped with these machines, adds another testimonial to the high efficiency of the Worthington pump.

The Delta Metal Co., Limited.—The ninth annual general meeting of the shareholders of the Delta Metal Co., Limited, was held at 110, Cannon Street, London, E.C., on Friday, 19th March, 1897. Mr. Chas. Cammell occupied the chair and moved the adoption of the report and statement of accounts for the year ending 31st December, 1896. In referring to the figures of the accounts, he mentioned that the total turnover showed an increase of 30 per cent. as compared with 1895; and the net profit was nearly double that of the previous year. After writing off for depreciation &c., a total amount of £1,203 10s. 3d., and placing £1,000 to Reserve Fund, it was proposed to pay a dividend of 7½ per cent. (less income tax), and carry forward the balance of profit to next account. The plant had been maintained in first-class condition and some additions made to it, and, as further facilities were required for a quicker output, the works had been enlarged by renting some additional premises adjoining the Pomeroy Street works. As mentioned in the report, the outlook for 1897 was very favourable; they had large contracts on hand, and had granted another licence for working the company's squeezing patents, from which further profits might be anticipated. The directors' report, statement of accounts and balance sheet for 1896 were unanimously approved and adopted, and a dividend of 7½ per cent. as proposed by the directors, declared. The retiring director, Mr. J. W. Meyjes was unanimously re-elected, and Mr. Geo. Williams re-appointed auditor for the current year, and the proceedings closed with a vote of thanks to the chairman.

Institution of Naval Architects.—The following is the programme for the annual meeting of the Institution of Naval Architects, to be held in the hall of the Society of Arts, John Street, Adelphi, on Wednesday, Thursday, and Friday, April 7th, 8th, and 9th. The Right Hon. the Earl of Hopetoun, G.C.M.G. (President of the Institution), will occupy the chair. Wednesday, April 7th.—Morning meeting at twelve o'clock. 1. Annual Report of Council. 2. Election of the president, the officers and council. 3. Address by the chairman, the Right Hon. the Earl of Hopetoun, G.C.M.G. The following papers will then be read and discussed:—1. "Recent Trials of the cruisers *Powerful* and *Terrible*," by A. J. Durston, Esq., C.B., R.N., Engineer-in-Chief of the Navy, Member of Council. 2. "Water-Tube Boilers in Warships," by Rear-Admiral C. C. P. Fitzgerald, R.N., Associate. 3. "A Mechanical Method of ascertaining the Stability of Ships," by A. G. Ramage, Esq., Member. Thursday, April 8th.—Morning meeting at twelve o'clock:—1. "On the Fighting Value of certain of the older Ironclads if re-armed," by Captain the Right Hon. Lord Charles Beresford, C.B., R.N., Associate. 2. "The Application of the Compound Steam Turbine to the Purpose of Marine Propulsion," by the Hon. Charles Parsons. 3. "On the Use of the mean Water-Line in designing the Lines of Ships," by A. G. Ramage, Esq., Member. Evening meeting at seven o'clock: 1. "The Accelerity Diagram of the Steam Engine," by J. Macfarlane Gray, Esq., Member of Council. 2. "Note on the Geometry of Stability," by J. Macfarlane Gray, Esq., Member of Council. 3. "Acetylene, and its probable Future afloat," by Professor Vivian B. Lewes, F.C.S., F.I.I., Associate Member of Council. Friday, April 9th.—Morning meeting at twelve o'clock:—1. "Nickel Steel as an improved Material for Boiler Shell-Plates and Forgings," by William Beardmore, Esq., Associate, 2. "Application of Electrical Transmission of Power in Marine Engineering and Shipbuilding," by Herr F. von Kodolitsch, Member. 3. Concluding proceedings. The annual dinner of the Institution will be held on Wednesday, April 7th, in the Grand Hall of the Hotel Cecil, Strand, at a quarter past seven.

Institute of Engineers and Shipbuilders of Hong Kong.—At the sixth annual general meeting of this Institution, held on January 30th, the committee of management presented their report for the year 1896, and congratulated the members on the continued prosperity of the Institute. The list of members still goes on increasing, the total membership being 327, against 289 in 1895, viz.:—Ordinary members 169, visiting members 100, associates 3, honorary members 3, and absent members 52. It is with profound regret that we have to note the decease of as many as seven members during the past year, viz.:—Vice-presidents A. Johnston and Geo. Fenwick, and members J. D. Patrick, J. Wallace, S. J. Williams, P. McGregor and P. Cellar, all of whom, in their respective spheres, did good work for the Institute. The committee have had to enter into another lease of these premises, with an increase of 20 dollars a month on the rent, no other place so suitable to our purposes being obtainable. Other premises were suggested, but when everything was taken into consideration, it was decided to remain here for the next three years (the lease being from June, 1897, to June, 1900), by that time, it is hoped, that we shall be wealthy and strong enough to lease premises in one of the new blocks about to be built on the Praya Reclamation.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Congo.—On February 16th an iron steam ketch of 150 tons gross, named the *Congo*, was launched at Hull, for the Ocean Steam Fishing Co., Limited, Grimsby.

Verbena.—On February 18th an iron ketch-rigged steamer, of 150 tons gross, named the *Verbena*, was launched at Beverley, for the Arctic Steam Fishing Co., Limited, Grimsby.

Rex.—On February 18th a steel schooner-rigged steamer, of 1,268 tons gross, named the *Rex*, was launched at Sunderland, for Captain Wallenberg, Stockholm.

Queen Mary.—On February 20th Messrs. Bartram & Sons launched at Sunderland a large steel screw steamer for Messrs. T. Dunlop & Sons, Glasgow. The vessel is of the spar-deck type, and is of the following dimensions:—Length, 344 ft.; breadth, 45 ft.; depth, 28 ft. 9 in. She has been built to the highest class in Lloyd's registry. The engines will be supplied by Messrs. John Dickinson & Sons, Limited, the cylinders being 24½ in., 40 in., and 66 in., by 45 in. stroke. The vessel was christened *Queen Mary* by Mrs. Robert Dunlop, wife of the managing owner.

Raven.—On Saturday, February 27th, Sir Raylton Dixon & Co. launched from the Cleveland Dockyards, Middlesbrough, a steam trawler of the following dimensions:—Length, 100 ft. 8 in.; beam, 20 ft. 5 in.; depth, moulded, 11 ft. 8 in. The vessel has been built to Lloyd's highest class for the Cleethorpes Steam Trawling Co., Limited, Grimsby, and is of the well-known type of steam fishing vessels, of which a large number have been built by Sir Raylton Dixon & Co. Triple-expansion engines will be fitted by the North-Eastern Marine Engineering Co., Limited, of Sunderland, the cylinders being 10 in., 17½ in., 30 in., by 21 in. stroke, with a large steel boiler working at 200 lbs. pressure. As the vessel was leaving the ways she was named *Raven*.

Equator.—On March 1st Messrs. R. and W. Hawthorn, Leslie & Co., Limited, launched at Hebburn-on-Tyne a steel twin-screw passenger and cargo steamer, 225 ft. by 32 ft. by 14 ft. 4 in. She is built to the requirements of Bureau Veritas, and designed to meet the special Caspian Sea trade, for which the company intend her. The vessel was named *Equator*, and is the second of four building to the order of the Eastern Carrying, Storing, Warrant and Insurance Co., of St. Petersburg.

Trevilley.—On March 1st there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a new steel screw steamer, built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall, of the following dimensions, namely:—Length, 323 ft.; breadth, 47 ft.; depth, 25 ft. moulded. The vessel is intended for general trade, is of the improved single-deck type, and is fitted with all the latest improvements for rapid loading and discharging of the cargo. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 24 in., 40 in., and 54 in. diameter, by 42 in. stroke, steam being supplied from two large steel boilers working at a pressure of 160 lbs. per square inch. She was named *Trevilley*.

Liolea.—On March 2nd the *Liolea*, a steel steam schooner barge of about 510 tons gross, was launched at North Shields for Mr. M. Vagliano.

Sargon.—On March 2nd the *Sargon*, an iron steam ketch of about 150 tons gross, was launched at Hull for the Standard Steam Fishing Co., Limited, Grimsby.

Prome.—On March 2nd the *Prome*, an iron steam ketch of about 140 tons gross, was launched at Newcastle for Mr. G. Beeching, Fleetwood.

Clan Macdonald.—On March 3rd Messrs. Doxford & Sons Limited, Pallion, launched the turret steamship *Clan Macdonald*, which has been built to the order of the Clan Line of steamers, Limited, Glasgow, and is the first of four sister ships for which the firm has booked orders. She is also the largest of the 30 turret steamers now afloat. The *Clan Macdonald* is 400 ft. long, with 50 ft. beam. Her gross register is 5,000 tons, and she has a deadweight capacity of 7,000 tons. Her large measurement capacity has been specially arranged for the Eastern trade. The engines with which she will be fitted are of the triple-expansion type, and these will be worked by three boilers of 180 lbs. working pressure, fitted with Howden's system of forced draught. She is reckoned to steam 13 knots per hour, and will be fitted with electric light installation throughout, including canal search light. The vessel is plated throughout on the improved joggled-plate system. She will carry ten steam winches and derricks, and there are side posts fitted to carry derricks to facilitate the handling of cargo, constructed on the method originally introduced by Messrs. Doxford & Sons in the British India Steam Navigation Co.'s steamers, *Fazilka* and *Faltala*, built in 1890. The vessel has been built under British Corporation special survey, and during her construction has been under the superintendence of Mr. J. Lyall, assisted by Mr. P. Jackson and Mr. Watts. She was christened *Clan Macdonald* by Miss Joss, the daughter of one of the owners

Lady Lewis.—On March 3rd Messrs. Elliott & Jeffrey launched at Cardiff a steel and iron screw steamer of the following dimensions:—105 ft. between perpendiculars, 20 ft. beam, 12 ft. depth; gross tonnage, 250. The vessel has been constructed for the purpose of accomplishing long and heavy towing, and has been built to Lloyd's highest class. The engines are compound surface-condensing, with cylinders of 22 in. and 42 in. diameter, and 24 in. stroke. She was named the *Lady Lewis*.

Amphitrite.—On March 3rd Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, successfully launched the new steamer *Amphitrite*. She is built to the order of Messrs. Stathatos Brothers, of Braila. Her principal dimensions are:—Length between perpendiculars, 320 ft.; breadth, extreme, 24 ft.; depth, moulded, 23 ft. 9½ in. She is built on the single deck rules to Lloyd's highest class, on the cellular double bottom principle, arranged with water ballast right fore and aft; water ballast is also fitted in the after peak. The vessel has strong hold beams at the main deck height, and has eight iron division bulkheads, with iron longitudinal bulkheads right fore and aft, except in the way of hatchways, where wood shifting boards are fitted. Five large cargo hatchways are fitted on the upper deck, and also a small hatch to the reserve bunker. These hatches are worked by five powerful steam winches, driven by a large multitubular donkey boiler, placed in the casings on the upper deck. A short poop is fitted aft, and in the bridge house amidships is placed the accommodation for captain, officers, engineers, and steward; spacious saloon, a limited number of spare berths, with the usual engineers' messroom, steward's pantry, large storerooms, bathrooms, &c. On top of the bridge is placed an entrance hall to the saloon and chartroom, and at the after end of the engine casing, on top of the bridge, a galley is placed. Seamen, firemen, and petty officers are berthed in the topgallant forecastle. On top of the forecastle is placed a patent steam capstan windlass for working the patent stockless anchors, and in addition an anchor crane is fitted. A patent steam steering gear is placed in the after end of the engine casings, and is worked by controlling gear from the upper bridge; screw gear is placed on top of the poop deck aft. The vessel is rigged as a two-masted fore-and-aft schooner. Four boats are fitted on the bridge deck. The vessel has been built with due regard for her special trade, with all the most modern appliances for the rapid handling of cargoes, and has been built of exceptional strength. She is fitted with engines by Messrs. Blair & Co., Limited, of Stockton. The sizes of the cylinders are 23½ in., 39 in., and 64 in., by 42 in. stroke, supplied with steam by two large multitubular boilers, working at 160 lbs. pressure. The ship and engines have been constructed under the superintendence of Mr. J. W. Donovan, on behalf of the owners. The vessel was launched by hydraulic power, and christened by Miss Taylor, daughter of Mr. John Taylor, of the firm of Messrs. Anderson, Horan & Co.

Britannia.—On Wednesday, March 3rd, Messrs. Wm. Gray & Co., Limited, launched a fine large steel screw steamer, which they have built to the order of Messrs. W. H. Cockerline & Co., of Hull. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, over all, 336 ft.; breadth, 47 ft.; and depth, 24 ft. 10 in. The deck erections consist of a full poop, long bridge, and topgallant forecastle. The saloon and captain's and officers' rooms will be fitted under the poop. The hull is built with web frames, and cellular double bottom for water ballast. Five steam winches, steam steering gear amidships and screw gear aft, patent

direct steam windlass, patent donkey boiler, grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Three cylinder triple-expansion engines of first-class make are being supplied by the Central Marine Engine Works of William Gray & Co., Limited. They will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine extra large steel boilers having a pressure of 160 lbs. per square inch will give an ample supply of steam. The construction of the ship and machinery have been under the superintendence of Mr. G. H. Strong, of Hull, on behalf of the owners, and the ceremony of christening the steamer *Britannia* was gracefully performed by Miss Ethel Cockerline, daughter of the managing owner. Amongst those present at the launch were Mr. T. D. Woodhouse, of W. H. Cockerline & Co., and Mrs. Woodhouse.

Helga.—On Thursday, March 4th, Messrs. Wm. Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 242 ft.; breadth, 34 ft.; depth, 18 ft. 10 in. She has been built to the order of Mr. Martin Carl, of Copenhagen, and will take Lloyd's highest class. The deck erections consist of poop, bridge, and forecastle. A handsome saloon, state-room, and accommodation for captain will be fitted up in the poop, and comfortable quarters for the engineers and officers amidships, and for the crew forward. The hull is built with deep frames and cellular double bottom, and ballast tank in the after peak. Four steam winches, large patent donkey boiler, steam steering gear placed in engine-room casing, hand-screw steering gear aft, direct steam windlass, schooner rig, boats on beams overhead, grain divisions, and all improved appliances for working the steamer will be provided. The engines are of the three-crank triple-expansion type, and are from the Central Marine Engine Works of Messrs. William Gray & Co., Limited, the cylinders being 18 in., 28½ in., and 47½ in. diameter, with 33 in. piston stroke, and a large steel boiler to work at a pressure of 160 lbs. per square inch. The steamer has been superintended during construction by Captain A. V. Knudsen, on behalf of the owner; and the ceremony of naming her *Helga* was gracefully performed by Mrs. Dr. Young, of West Hartlepool.

Dunblane.—On March 4th Messrs. Ropner & Son, Stockton, launched the large screw steamer *Dunblane*, which has been built by them to the order of Messrs. Macbeth & Gray, of Glasgow. The steamer is of Messrs. Ropners' patent trunk type, designed to carry a very large measurement cargo. She is 330 ft. long by 45 ft. broad by 28 ft. 10½ in. moulded depth, and will carry 6,000 tons deadweight and 8,000 tons measurement. Triple-expansion engines will be fitted by Messrs. Blair & Co., Limited, Stockton, and work at the high pressure of 180 lbs. The steamer and engines are throughout fitted with all the latest improvements for rapid and economical working. She was gracefully named the *Dunblane* by Miss May Gray, of Whitehall, Pollokshields, daughter of one of the owners.

Laurel.—On March 4th the *Laurel*, an iron steam ketch of about 150 tons gross, was launched at Beverley for Mr. W. Grant, Grimsby.

Rugby.—On March 4th Messrs. John Priestman & Co. launched at Southwick, Sunderland, a large steel screw steamer, built to the order of Messrs. Galbraith, Pembroke & Co., of London. Her dimensions are:—Length, 336 ft.; breadth, 47 ft.; depth, moulded, 26 ft. 10 in., with a large carrying capacity on a light draught, and she has been constructed to the three-deck rule of Lloyd's Register, in which she will be classed 100 A. A full poop is fitted aft, long bridge house amidships, and topgallant forecastle, and the vessel is divided into watertight compartments by five steel bulkheads. A double bottom forward and aft, divided into five separate tanks, provides 830 tons of water ballast. The steam steering gear is placed in the after end of the bridge, and is controlled from the pilot bridge by a lever shaft. There is a handsome saloon, with accommodation for captain, in a large deckhouse on the bridge deck, and the officers and engineers are comfortably berthed in a house at the sides of the engine casing, and the crew in the topgallant forecastle. The engines, which are of the triple-expansion type, have been built by Messrs. Blair & Co., of Stockton-on-Tees, and have cylinders 24 in., 40 in., and 66 in. diameter, with a stroke of 45 in. The boilers are two in number, working at a pressure of 160 lbs. per square inch. The launch was in every way successful, the chris ening ceremony being performed by Mrs. Priestman, who named the vessel *Rugby*. During construction she has been under the supervision of Mr. Sheppard and Captain Marchant on behalf of the owners.

T. R. Thompson.—On March 5th the *T. R. Thompson*, a steel steam schooner of about 3,220 tons gross, was launched at Sunderland for Mr. J. Westall, of Sunderland.

Westward Ho.—On March 5th the *Westward Ho*, an iron steam ketch of about 150 tons gross, was launched at Newcastle for Messrs. S. T. White & Chant, Hull.

Avon.—On Friday, March 5th, an extremely finely-modelled twin-screw steamer was launched by Messrs. Wigham Richardson & Co. from their Neptune shipyard, Newcastle, for the fast passenger and cargo service of Carron Co. between London and Grangemouth. The steamer is built of steel to the highest class in Lloyd's Register, 300 ft. in length, and will have two masts with a light fore-and-aft rig. The accommodation for passengers will be of the most luxurious character. The first-class, 100 in number, will have a large dining-saloon on the bridge-deck amidships, and forward of it there will be a large music-saloon. A smoking-room will also be provided on the same deck aft. The ladies' room, with the stewardesses' room, lavatories, &c., will be on the main deck. The second-class passengers will be accommodated aft in the poop, and there will also be accommodation for a large number of third-class. The engines, which will be very powerful, will be of the triple-expansion type, each set having four cylinders and four cranks, self-balanced on the Yarrow, Schlick and Tweedy system. With engines balanced on this system all vibrations disappear, and naturally a great cause of discomfort to passengers is therefore removed. The *Avon* will be the only passenger vessel on the East Coast with such engines, and she is expected on this account, without taking into consideration her high speed and luxurious accommodation, to become at once a great favourite with the public. The arrangements for working the ship herself and the cargo will be of the most modern and improved description, including four powerful steam and hydraulic cranes, steam and hydraulic steam steering gear (all Brown's patents); one amongst the many advantages of these is that, being noiseless, they cause no annoyance to passengers. The vessel will be a faster boat, and generally a very great improvement over the steamer *Grange*, built a few years ago by Messrs. Wigham Richardson & Co. for Carron Co., and which has been very popular on the London and Grangemouth service. As the vessel left the ways she was named the *Avon*, the christening ceremony being performed by Mrs. Tweedy, of Newcastle-on-Tyne. The launch was witnessed by a goodly company, amongst whom were Mr. Maclaren, one of the principal partners of Carron Co.; Mr. Jardine, also representing Carron Co.; and Mr. Spears, marine superintendent to Carron Co., under whose supervision the vessel is being built.

Albatross.—On March 6th the *Albatross*, an iron steam ketch of about 150 tons gross, was launched at Beverley for Mr. S. Baskcomb, of Grimsby.

Roebuck.—On March 6th the *Roebuck*, a steel steam schooner of about 1,300 tons gross, was launched at Barrow for the Great Western Railway Company, Milford.

Pendennis.—On Saturday, March 6th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Pendennis*, to the order of Mr. Richard B. Chellew, of Truro. The vessel will take Lloyd's highest class, and her dimensions are:—Length, over all, 300 ft.; breadth, 42 ft.; and depth, 21 ft. 9 in. The deck erections consist of a full poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward. The hull is built on the web-frame system, with a cellular double bottom, large aft peak tank, large hatchways, four steam winches, steam steering gear amidships, hand screw gear aft, large patent donkey boiler, patent direct steam windlass, boats on beams overhead, iron grain division, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply fine triple-expansion engines of 1,000 H.P., having cylinders 21½ in., 35 in., and 58 in. diameter, with a 39-in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The vessel and machinery have been built under the superintendence of Mr. John Chellew and Mr. Geo. Hobson, and the double ceremony of christening the steamer *Pendennis* and launching

her was gracefully performed by Miss Marion Ethel Hinks, daughter of Mr. Joseph Hinks, of Milverton Lawn, Leamington Spa. The *Pendennis* is the fifth ship built by Messrs. Wm. Gray & Co., Limited, for Mr. Richard B. Chellew.

Douro.—On March 8th Messrs. Cook, Welton & Gemmell launched at Hull the iron steam trawler *Douro*, a vessel of about 150 tons gross. She is to class 100 A1, and is owned by the Ocean Steam Fishing Co., Grimsby.

Manoussis.—On Monday afternoon, March 8th, there was launched from the East Yard of Messrs. C. S. Swan & Hunter, Limited, of Wallsend, a steel screw steamer, built to the order of Messrs. Galbraith, Pembroke & Co., of London. This vessel, which is built to the highest class at Lloyd's partial awning deck rule, is 275 ft. between perpendiculars by 39 ft. 6 in. beam by 20 ft. 3 in. depth, moulded. She has been constructed to carry 3,000 tons deadweight on a light draught, and is fitted with all the requirements for the special trade of Mr. Basillo Embricos, of Andros: whilst for running between ports in ballast she has been fitted with unusually large water ballast tanks. The machinery for this vessel has been constructed by the Central Marine Engine Works of West Hartlepool, and consists of a set of engines with cylinders 21 in., 33 in., and 56 in. diameter, and 36 in. stroke, with two large steel boilers fitted with patent furnaces, working at a pressure of 160 lbs. per square inch. On leaving the ways the steamer, which is of a fine and pleasing model, was christened *Manoussis* by Mrs. Frank Trewent, of London. During the construction the steamer has been surveyed by her future commander, Captain Bistis, and the engines by Mr. J. C. Clark.

Newport.—On March 9th Mr. Joseph Scarr, Grovehill, Beverley, launched a steam barge of the following dimensions:—Length, 66 ft.; breadth, moulded, 14 ft. 6 in.; depth, moulded, 8 ft. 3 in.; engines compound surface condensing, high pressure, 8 in. diameter; low pressure, 16 in. diameter, both having a stroke of 12 in. Boiler of marine type, 6 ft. long by 6 ft. diameter, with 62 tubes, and with a total heating surface of 248 square feet. The vessel was christened the *Newport* by Miss G. Scarr, and is built to the order of Messrs. Williamson & Co., of Goole.

Penguin.—On March 12th Palmer's Shipbuilding Co. launched at Jarrow-on-Tyne the steel steamer *Penguin*, a vessel of about 207 tons gross. She will receive the highest class in Lloyd's register, and is owned by the Australian Government.

Oakmore.—On Thursday, March 18th, Messrs. Richardson, Duck & Co. launched a fine steel screw steamer (the largest yet built at Stockton) of the following dimensions:—Length, over all, 415 ft. 6 in.; breadth, extreme, 47 ft.; depth, moulded, 31 ft. 6 in.; gross tonnage, 4,600 tons. This vessel has been built to the order of Messrs. William Johnston & Co., Limited, Liverpool, for their American and Canadian general and cattle trade. She will class 100 A1 at Lloyd's, and has been built under special survey. The deck erections consist of long extended poop and forecastle and long bridge. The spaces between these erections will, however, be closed in above bulwarks and decked over, thus forming one continuous deck fore and aft. Accommodation for captain, officers and engineers is provided in houses on bridge deck. Crew are berthed in topgallant forecastle, and cattlemen in lower forecastle and aft. Cattle stalls will be fitted for the entire length of upper deck and on bridge deck. A cellular double bottom throughout, and fore-and-aft teak tanks are fitted for water ballast. Vessel is rigged as a four-masted schooner, and equipment includes eight steam winches, large marine multitubular donkey boiler, by Messrs. Blair & Co., 120 lbs. working pressure, steam windlass, stockless anchors, steam steering gear in house aft, actuated from bridge by shafting, double derricks to each of seven hatches, &c., &c. A complete installation of electric lighting is being fitted by Messrs. J. H. Holmes & Co., Newcastle. The engines, by Messrs. Blair & Co., have cylinders 25 in., 41½ in., 71 in. by 54 in. stroke, steam being supplied by two double-ended boilers, with a working pressure of 200 lbs. As the vessel was leaving the ways she was christened *Oakmore* by Mrs. C. W. Littleboy, of Saltburn.

Drumgarth.—On Thursday afternoon, March 18th, there was launched from the Southwark yard of Messrs. Robert Thompson & Sons, a steel spar-deck steamer, built to the order of Messrs. Gillison & Chadwick, of Liverpool, her dimensions being as follows:—Length, over all, 362 ft.; breadth, 46 ft. 6 in.; depth, moulded, 27 ft. 11 in.; built to the highest class at Lloyd's, has cellular bottom and both peaks for water ballast, poop aft, long bridge amidships and topgallant forecastle. The accommodation for captain and officers is in the forward part of the bridge, engineers' rooms being at after end and crew in topgallant forecastle. The vessel has five large hatches, all being fitted with double derricks, for the rapid loading and discharging of cargo, and has in addition a 25-ton derrick placed on deck to the main hatch, and six powerful steam winches, multitubular donkey boiler, steam steering gear in engine-room, with control shafting to wheelhouse on bridge. A very powerful winch is placed on the poop for transporting purposes, a gangway being fitted from poop to bridge and bridge to forecastle to enable the officers to get from end to end of vessel without going on the spar-deck in bad weather. The vessel is fitted with double the usual number of ventilators in the holds to ensure good ventilation, is schooner-rigged with telescopic masts, and will be fitted out with everything to make her a first-class up-to-date cargo steamer, being specially designed to carry a large cargo on light draught. The engines are by Messrs. George Clark, Limited, having cylinders 24½ in., 40 in., 66 in. by 45 in. stroke, with two boilers 16 ft. by 11 ft., 180 lbs. pressure. On leaving the ways she was gracefully christened the *Drumgarth* by Mrs. Gillison, wife of one of the owners.

Zaneta.—On March 18th Messrs. Wm. White & Sons launched at Cowes a composite steam yacht. Her principal dimensions are:—Length over all, 123 ft.; length, on waterline, 102 ft.; breadth, 15 ft. 6 in.; draught, 7 ft. 6 in., and 114 tons. The boiler and machinery have also been constructed by the same firm. She was built for Mr. Alfred Shuttleworth and was named the *Zaneta*.

Ben Lomond.—On March 19th there was launched at South Shields by Messrs. Eltringham & Co. a screw trawler, built to the order of the North British Steam Fishing Co., Limited, Aberdeen. She is to be classed 100 A1 at Lloyd's for fishing purposes. Her dimensions are—95 ft. keel, 19 ft. beam, and 11 ft. depth. She is to be engined by Messrs. G. T. Grey & Co, South Shields, having cylinders 16 in., 32 in., and 22-in. stroke, and the boiler pressure 130 lbs. She was christened the *Ben Lomond*.

Maylands.—On Saturday, March 20th, Messrs. Furness, Withy & Co., Limited, launched from their Middleton shipyard, Hartlepool, a large steel screw steamer of handsome design to the order of Messrs. J. F. Wilson & Co., West Hartlepool. She is a fine type of a modern cargo boat, measuring over 320 ft. in length, and built throughout of Siemens-Martin steel with large measurement and deadweight carrying capacity of about 4,170 tons, built to the highest class at British Corporation. The vessel is of the single-deck type, with poop, bridge and forecastle. The holds are fitted with iron grain divisions, and all deck erections, skylights, bulwarks, &c., are constructed of steel and iron, cellular double bottom fitted fore-and-aft for water ballast; the after peak being also available as a tank. The greater portion of the plates are in 24 ft. lengths, making the structure of the vessel very strong. Four large, powerful winches, two donkey boilers, patent steam steering gear amidships, screw gear aft, direct steam patent windlass, stockless anchors, hauling into hawse pipes, and other modern appliances are fitted for the handy working of the ship, and she ought to be an acquisition to the fleet of the owners. The saloon and cabin providing accommodation for the captain, &c., are handsomely finished in polished hardwood. The vessel will be rigged as a two-masted fore-and-aft schooner, and will be fitted with triple-expansion engines of massive design, with every provision for economical working, by Messrs. Thomas Richardson & Sons, Limited, Hartlepool. The vessel and machinery have been constructed under the superintendence of Mr. J. Maddison, on behalf of the owners. On leaving the ways she was gracefully christened *Maylands* by the Mayoress of West Hartlepool, Mrs. J. F. Wilson.

LAUNCHES—Scotch.

Fife Ness.—On February 15th a steel steamer of 126 tons gross, named the *Fife Ness*, was launched at Aberdeen for the Moss Fishing Co., Kirkcaldy.

Waikari.—On February 18th a steel schooner-rigged steamer, of 3,097 tons gross, named the *Waikari*, was launched at Dumbarton for the Union Steamship Co., of New Zealand, Limited.

Fishing Yacht.—On February 24th Mr. James Adam, boat-builder, Gourock, launched a fine fishing yacht for Mr. Ebenezer Ramsay, The Club, Greenock. The vessel, which is intended for whale fishing, is built of oak timbering planked with teak, and is 50 ft. in length, 10½ ft. beam, and 6 ft. 9 in. deep moulded, with three bulkheads. She is fitted with compound surface-condensing engines, supplied by Mr. White, Greenock. She measures 32 tons, and is ketch rigged.

Devonshire.—On February 24th Messrs. Russell & Co., Port-Glasgow, launched a steel screw steamer named *Devonshire*, to the order of Messrs. J. & A. Roxburgh, Glasgow, This steamer was built under the superintendence of Captain Pritchard, will carry 5,800 tons deadweight, and measures –Length, 340 ft.; width, 46 ft.; depth, 28 ft. 6 in. Her engines will be supplied by Messrs. Rankin & Blackmore.

Atagosan Maru.—On March 2nd there was launched from the shipbuilding yard of Messrs. Archd. M'Millan & Son, Limited, a finely-modelled steel screw steamer, the second of two similar vessels being built to the order of Messrs. Mitsui & Co., of Nagasaki and London. The principal dimensions are:—Length, 290 ft.; breadth, 38 ft.; depth, 22 ft.; 1,900 tons gross register. She has a large bridge, topgallant forecastle, and hood aft, two complete decks of steel—the upper; as also the bridge and forecastle decks, being sheathed with teak. Water ballast is being provided for in cellular double-bottom fore and aft (subdivided into six compartments), in deep tanks amidships (which can also be used for cargo), and in aft peak. The accommodation for officers, engineers, and a few passengers is arranged in large airy rooms under bridge deck, while the crew and petty officers are located in the topgallant forecastle. The captain's room and chart-room are situated in a large teak deckhouse on the bridge deck. Complete arrangements are made on deck for navigating the vessel and the rapid and efficient working of cargo, as is the case in all the Japanese steamers presently being built on the Clyde. A number of cargo and coaling ports are provided in the ship's side, and gangways fitted in the bulwarks abreast of the hatch-ways. The machinery, which is being supplied by Messrs. Da vid Rowan & Son, Glasgow, has cylinders 23 in., 38 in., and 62 in. diameter, with a stroke of 42 in., and the steam pressure is175 lbs. The ceremony of naming the vessel *Atagosan Maru* was gracefully performed by Miss Babtie, Dunbritton House, Dumbarton, who, in accordance with Japanese custom, liberated a flock of pigeons on the floating of the vessel. The vessel is being built under special survey of Lloyd's, and under the instructions of Mr. A. R. Brown, the Japanese Consul at Glasgow.

Sahara.—On March 3rd Messrs. Alex. Stephen & Sons daunched at Linthouse a handsome steel screw steamer of th, himensions—370 ft. by 48 ft. by 27½ ft., with full poop, bridgee ouse, and topgallant forecastle, and fitted with engines (also built at Linthouse) having cylinders 23 in., 41 in., and 67 in. diameter, by 45 in. stroke, supplied with steam at 175 lbs. pressure from boilers fitted with Howden's forced draught. This vessel is practically a sister ship to the s.s. *Nyanza*, launched in December, and embraces alike in design and equipment everything that wide experience suggests as the best for her intended work. She is the fifteenth steamer built by Messrs. Stephen for the same owners, Messrs. Maclay & McIntyre, of Glasgow, and will be a worthy addition to the arge fleet of this firm. She was named *Sahara* by Miss McIntyre.

Empress Queen.—On March 4th the Fairfield Shipbuilding and Engineering Co., Limited, launched the *Empress Queen*, a large paddle steamer which they have built for the Isle of Man Steam Packet Co. The *Empress Queen* is a vessel of 2,000 tons gross, constructed of steel throughout, and when completed will rank as the largest and most powerful paddle steamer afloat. She is to have engines of 10,000 I.H.P., and has been splendidly fitted up for the accommodation of a large number of passengers. The new steamer is intended for the Liverpool and Douglas service of the Isle of Man Steam Packet Co., and will be the finest and fastest vessel in their fleet. The name *Empress Queen* has been given her by Her Majesty's special permission and in honour of her diamond jubilee. The principal dimensions of the new steamer are:—Length, 375 ft.: breadth, 83 ft. 6 in.; depth, moulded, 25 ft 6 in. The hull is divided into watertight compartments by steel transverse bulkheads, which, besides reducing the risk of foundering to a minimum, materially augment the strength of the structure, forming valuable supports and ties between the decks and framing. The decks are four in number, and are termed "lower," "main," "spar," and "promenade." Dining accommodation for 124 first-class passengers is provided in a handsomely-furnished saloon on the lower deck. The forward part of the ship is allotted to second-class passengers. The dining saloon, forward of machinery space, on the lower deck, having bar and pantry adjoining, provides ample accommodation for the second class. On the same deck, and forward of this, is a ladies' second-class saloon. The main deck above is arranged as a second-class shelter, and contains a bar, buffet, mail and parcel room. On the spar deck aft, in houses, are several private cabins, fitted with berths, &c., in the very newest style; and amidships on the same deck is a cloak-room and combined bar and smoking-room; while all fore and aft every available space is utilised for sitting-room, there being sparred seats sufficient to seat over 560 persons. Above the spar deck is a spacious promenade deck, extending from the fore end of the boiler-room right aft to the end of the first-class cabin, with buoyant seats running the entire length, excepting a small portion at the after end, which is required for the boats. The stowage of the boats has received special attention, so as to allow of immediate launching if necessary. The promenade deck covers about three-fourths of the length and the whole breadth of the vessel, and being unobstructed by anything but absolute necessities, such as captain's house and bridges, it in every way justifies the title, promenade. The bridges which surmount the promenade deck are placed, one at the foremost extremity for navigating purposes, and the other between the funnels, and extending from sponson to sponson. From both of these bridges the bow and stern rudders are controlled by means of wheels connected with independent steam steering gears placed below on the engine-starting platform. A hand-screw steering apparatus is also placed in reserve aft in case of emergency. Docking and engine telegraphs are provided on each of the bridges. A complete installation of electric light is fitted on board, including deck and embarkation lights, &c., all on the most improved system. A steam capstan windlass is fitted forward for working the ship's cables, and on the spar deck aft a powerful capstan is fitted for warping and mooring purposes. A double-acting steam winch is fitted forward for the speedy handling of luggage, &c. The vessel will be fitted with compound diagonal surface-condensing engines, the largest and most powerful paddle-wheel engines yet built. There will be three steam cylinders placed side by side, and working on three cranks, the high-pressure cylinder being placed between the two low-pressure cylinders. The high-pressure cylinder is fitted with a piston valve, and each of the low-pressure cylinders with flat slide valves, all controlled by the usual double eccentrics and link motion valve gear. The crank shaft is a ponderous piece of machinery. It is built, and together with the paddle shafts is forged of mild steel and bored hollow. The starting and reversing is effected by a large steam and hydraulic engine on the direct-acting principle. The paddle-wheels are made of steel, and constructed on the feathering principle with curved floats. Steam is supplied to the engine by four double-ended boilers arranged in two compartments, one forward and one aft of the engine-room. The boilers are of the multitubular return-tube marine type, each having eight corrugated furnaces, and constructed entirely of steel to Board of Trade requirements. They are adapted to work with Messrs. Howden's system of forced draught, and the necessary fans and engines will be fitted to supply air to the furnaces. The vessel will have two funnels, and will be rigged as a schooner with two pole masts, and when completed will form a valuable addition to the already renowned fleet of the Isle of Man Steam Packet Co., Limited. She has been constructed under the superintendence of Mr. H. H. West, naval architect of Liverpool. Mrs. Mylrea, wife of the chairman of the Isle of Man Steam Packet Co., performed the naming ceremony.

The Tortoise.—On March 4th Messrs. Lobnitz & Co., Limited, launched from their shipyard in Renfrew the third of a class of water-tank vessels, built to the order of the British Admiralty. The vessel, which was named *The Tortoise*, was constructed under the supervision of Messrs. Carr, Harding, & Newton, Admiralty overseers.

Wakasa Maru —On March 8th there was launched from the shipbuilding yard of Messrs. David & William Henderson & Co. Partick, a handsomely modelled twin-screw steamer, which has been built to the order of the Nippon Yusen Kaisha, of

Tokio, under the supervision of A. R. Brown, Esq., Japanese Consul at Glasgow, who has been assisted by Captain Periam for the hull, and Mr. George McFarlane for the engine department. Her principal dimensions are:—Length, over all, 463 ft.; beam, moulded, 49 ft. 2 in.; depth, moulded, 33 ft. 6 in.; and a gross tonnage of about 6,000 tons, classed in Lloyd's 100 A1 three-deck rule. The vessel is of the same dimensions as the two steamers which the builders have recently completed for the same owners. The general arrangements are also somewhat similar, but the *Wakasa Maru* will have more passenger accommodation, and will be rigged as a two-masted fore-and-aft schooner. A most complete installation of electric light by W. C. Martin & Co., Glasgow, is being fitted, and the vessel is also ventilated throughout on the Baird-Thompson principle. A refrigerating chamber is fitted up by the Linde Co. The machinery will be supplied by the builders' firm, and consists of two sets of triple-expansion engines, each having cylinders, 20 in., 33½ in., and 56 in. diameter, by 48 in. stroke. Steam is supplied by two large double-ended and two single-ended boilers, constructed for a working pressure of 200 lbs. per square inch. On leaving the ways the vessel was gracefully named the *Wakasa Maru* by Mrs. McMillan, wife of Captain McMillan, one of the company's commanders.

Nile.—On March 9th Messrs. R. Napier & Sons, Limited, launched from their shipyard at Govan a steel screw steamer of about 2,000 tons gross for the Glasgow Shipowners' Co., Limited (Messrs. Glen & Co., St. Vincent Street, Glasgow). The principal dimensions are:—Length, 280 ft.; breadth, 40 ft.; and depth, 21 ft. 6 in. The vessel has a full poop, long bridge and topgallant forecastle, is built on the deep frame principle, with cellular double bottom all fore-and-aft, and is classed 100 A1 at Lloyd's under special survey. She has been designed for the company's service, and is fitted with most modern appliances for the efficient working of ship and cargo. Comfortable accommodation has been provided in the poop for the captain and officers, the engineers are berthed in the bridge-house, and the sailors and firemen in the forecastle. As the vessel commenced to move down the ways she was gracefully named the *Nile* by Miss Mitchell.

Ulceley.—On March 9th Messrs. Mackie & Thomson, Govan, launched the steel screw fleeter, *Ulceley*, another of the list which they are building for Messrs. Hagerup, Doughty & Co., Grimsby. The vessels are of 160 tons each, and are being supplied with triple-expansion engines by Messrs. Muir & Houston, Kinning Park.

Gypsy.—On March 9th the Fairfield Shipbuilding and Engineering Co., Limited, launched the torpedo-boat destroyer *Gypsy*, which they have built for the British Government. She is the first of three similar vessels building at Fairfield. They are expected to attain on trial a speed of 30 knots per hour.

Musgrave.—On March 11th Messrs. Scott & Sons launched from their shipbuilding yard at Bowling a twin-screw tug of dimensions 122 ft. 6 in. by 24 ft. 6 in. by 12 ft. 10 in., which they have built for the Belfast Harbour Commissioners. Messrs. Maccoll & Co., Limited, Abercorn Basin, Belfast, supply the machinery. On moving down the ways the vessel was named *Musgrave* by Mrs. H. Maccoll, Saxonia, Belfast.

Strathmore.—On March 11th there was launched from the yard of Messrs. Russell & Co., Port-Glasgow, a handsomely-modelled steel saloon paddle steamer, which is the first of two steamers building for Captain John Williamson, Rothesay. The principal dimensions of the new steamer are:—Length, 200 ft.; breadth, 24 ft.; depth, 15 ft. The hull is divided into watertight compartments by steel transverse bulkheads. Dining accommodation for 80 first-class passengers is provided in a handsomely-furnished saloon on the lower deck aft. On the main deck above is the saloon, having ladies' cabin, &c., which is fitted up in polished wood, and tastefully upholstered in crimson moquette. The saloons are being furnished throughout by Messrs. Wylie & Lochhead in an exceedingly chaste manner, while the ventilation has been designed and worked out on the most approved principles. The forward part of the steamer is allotted to second-class passengers. The main deck being entirely covered in makes a fore saloon, the dining saloon being on the lower deck, having bar, pantry, &c., providing ample accommodation and facilities for a large number of passengers. Above the main deck, extending from stem to within 10 ft. of stern, the full breadth of the ship, is a spacious promenade deck, on which are placed the chart-room and ticket-office, above which is the navigating bridge. The steamer will be lighted by a complete installation of electric light on the most improved system. The vessel will be fitted by Messrs. Rankine & Blackmore with compound diagonal surface condensing engines of the most modern type, having Brown's reversing gear, Weir's pumps, filters, feedheaters, &c. Steam is supplied by one large boiler of the Navy type, constructed entirely of steel to Board of Trade requirements. Mild forced draught with engine and fans will be supplied for regular distribution of air to furnaces. As she left the ways she was named the *Strathmore* by Miss Lila Williamson, Rock Villa, Rothesay.

Wynford.—On March 16th Messrs. William Hamilton & Co. launched from their Glen Yard, Port-Glasgow, a steel sailing barque of 1,980 tons gross and 1,857 tons net register tonnage, to carry 3,400 tons deadweight, for Messrs. Hickie, Borman & Co., London. The following are the principal dimensions:—Length, about 270 ft.; breadth, 40 ft.: depth, moulded, 25 ft. 1½ in. The vessel has been built to the highest class at Lloyd's, and is fitted out in the most modern manner for the quick and easy working of the ship. The accommodation for the officers and crew are of the most complete description. As the vessel left the ways she was named the *Wynford* by Mrs. Robert Hickie, of Wynford, Abbey Wood, London. The *Wynford* is the second vessel built by Messrs. Hamilton for the same owners, and is a sister ship to the *Willscott*, launched last year.

Ventnor and Waltham.—On March 16th Messrs. Mackie & Thomson, Govan, launched the steam fleeters *Ventnor* and *Waltham*. The vessels are of about 160 tons each, and are a further instalment of the fleet being built for Messrs. Hagerup, Doughty & Co., Grimsby. They were named by the Misses Macouat, of Arden, Jordanhill.

Osado.—On March 16th the Clydebank Engineering and Shipbuilding Co., Limited, launched from their yard a twin-screw torpedo-boat destroyer named the *Osado*, constructed for the Spanish Government. The Clydebank Co. some time ago received orders to build for the Spanish Government a number of vessels of this class, and recently they delivered the *Furor* and *Terror*, after they had gone through speed trials very satisfactorily. The *Osado* will be similar to the *Furor* and *Terror*, and will carry the same armament, but the tonnage will be somewhat greater, and she is to steam two knots faster. While resembling in appearance the destroyers built at Clydebank for the British Government, these vessels have some necessary modifications in arrangements and fittings, principally with the view to making them suitable for service in very hot climates. His Excellency Count Casa Valencia, the Spanish Ambassador, was present at the launch, and the christening ceremony was performed by his two daughters, the Misses Marie Teresa and Consuelo Casa Valencia.

Lovart.—On March 20th Messrs. Carmichael, Maclean & Co. launched from their shipbuilding yard, Greenock, for Messrs. Love, Stewart & Co., of Glasgow and Bo'ness, a steel screw-steamer of 1,050 gross, classed 100 A1 at Lloyd's, and of the following dimensions:—Length between perpendiculars, 225 ft.; breadth, 34 ft.; depth, moulded, 15 ft. 3 in.; to carry 1,500 tons deadweight, and is intended for the Baltic coal and timber trade. The ceremony of naming the vessel the *Lovart* was performed by Miss Stewart, daughter of one of the firm.

Leopard.—On March 20th H.M.S. torpedo-boat destroyer *Leopard* was launched by the Naval Construction and Armaments Co. at Barrow. She is the fourth 30-knot boat built at the same yard.

Largo Bay.—On March 22nd there was launched from the Dundee Shipbuilding Co.'s yard a steam line fishing boat, built to the order of the Bay Steam Fishing Co., Anstruther. She is 123 tons gross, and her dimensions are as follows:—Length, 95 ft.; breadth, 19 ft. 6 in., and depth moulded, 10 ft. 6 in. She is to be fitted with compound surface-condensing engines, to be constructed by Messrs. Cooper & Greig. She was christened the *Largo Bay*.

Lark.—On Tuesday, March 23rd, there was launched from the Granton Shipbuilding yards finely-modelled wooden steam line fishing vessel built by Mr. A. Marr, of Leith and Granton, to the order of Mr. J. Lewis, Aberdeen. Her dimensions are:—Length between perpendiculars, 90 ft.; beam, 19 ft. 6 ins.; and

hold, 10 ft. 4 in. On leaving the ways she was named the *Lark* by Miss Ina Lewis, daughter of the owner. She is the second similar vessel built by Mr. Marr for the same owner.

TRIAL TRIPS.

Hakata Maru.—On February 23rd the large twin-screw steamer *Hakata Maru*, 5,811 tons gross, went down the river and on the 25th ran her speed and coal consumption trials. During the two days the machinery worked admirably, without the slightest hitch, and gave every satisfaction to the owners' representatives who were on board. A mean speed of fully 14 knots was easily obtained, and this being considerably over the guaranteed speed more than realised the anticipations of owners and builders. The *Hakata Maru* is the second steamer built by Messrs. David and William Henderson & Co., Partick, for the Nippon Yusen Kaisha of Tokio, through their representative in this country, Mr. A. R. Brown, Japanese Consul, Glasgow. Messrs. Henderson have other three steamers of similar size in hand for the same owners.

Landana.—On Friday, February 26th, the steel screw-steamer *Landana*, constructed at Cleveland Dockyards of Sir Raylton Dixon & Co, for Messrs. Elder, Dempster & Co., of Liverpool, was taken out to sea for her official trial trip under the command of Captain Clare. This vessel has been built under the superintendence of Captain Evans, and her principal dimensions are 321 ft. by 44 ft. by 26 ft. moulded, and she is built to Lloyd's highest class, spar deck rule, with a large deadweight carrying capacity on a light draught of water. She is a spar deck steamer with poop, bridge and forecastle decks. She is also fitted with six steam winches, and very complete discharging gear. The accommodation for captain, officers, and engineers is in house on bridge deck, with crew in topgallant forecastle. Triple-expansion engines have been fitted by Messrs. The North Eastern Marine Engineering Co. Limited, Wallsend, having cylinders 23 in., 36 in., 59 in. by 42 in. stroke, with two large boilers working at 160 lbs. pressure. At the conclusion of the trials, which were very satisfactory, the vessel proceeded to South Wales to load for South America.

Vlug.—On March 2nd the fine steel screw-steamer *Vlug* went on her trial trip. She has been built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Nielsen, Van Holk & Co., of Amsterdam, to Lloyd's highest class, and is 243 ft. in length by 34 ft. 6 in. breadth by 17 ft. 3 in. depth. The machinery has been supplied by the Central Marine Engine Works of Wm. Gray & Co., the engines having cylinders 18 in., 28½ in., and 47½ in., by 33 in. piston stroke, and the boiler being of large size, capable of giving an ample supply of steam at 160 lbs. working pressure. The vessel has been superintended during construction by Captain B. Eliasen and Mr. Tideman on behalf of the owners. The *Vlug* underwent the usual manœuvring in the bay for the testing of her capabilities, when everything was found to work admirably, and the vessel at once proceeded to Dunston-on-Tyne to take in cargo.

Bittern.—On March 4th the new steamer *Bittern*, built to the order of the Cork Steamship Co., Limited, proceeded down the river on her official trial trip. Amongst those on board were Mr. Kelson and Captain Horn, representing the Cork Steamship Co., Mr. W. B. Thompson, Mr. A. J. W. Reid, and Mr. Grant Barclay, of Caledon shipyard, and a number of others. The speed attained by the vessel was 12 knots an hour, being one and a half knots in excess of the guaranteed speed. Mr. Alexander M'Gavin, late steward in the employment of the D. P. & L. Shipbuilding Co., purveyed an excellent dinner, after which the usual toasts were heartily pledged. The *Bittern* is to sail for Ghent, and is the seventh steamer built by the Caledon Shipbuilding Co., Limited, for the Cork Steamship Co. Her dimensions are:—220 ft. between perpendiculars by 32 ft. beam by 16 ft. 6 in. moulded depth, deadweight 1,100 tons, including bunkers, on a 15 ft. 1 in. draught. Speed about 10½ knots laden. Height of 'tween decks, that is, poop and forecastle, 7 ft.; cubic measurement about 45,000 cubic ft. Engines 19 in., 31 in., and 50 in. by 33 in. stroke; boiler 15½ ft. by 10 ft. 5 in., donkey boiler, two 6 in. by 10 in. steam winches.

Verona.—On March 5th this steamer, which was built by Messrs. Short Brothers, at Sunderland, to the order of the Verona Steamship Co., Limited, Glasgow, of which Messrs. Gow, Harrison & Co. are the managers, left the Wear on her trial trip with very satisfactory results. The vessel is of the following dimensions, viz.:—Length, 352 ft.; breadth, 45 ft.; and depth moulded, 27 ft. 9 in.; with a deadweight carrying capacity of about 5,800 tons. She has been built of steel under the special survey of the surveyors to the British Corporation, and is constructed on the deep-frame principle, thus leaving the holds clear of obstructions. The holds are four in number, with double derricks at each hatchway, also two steam winches at each hatch for the rapid handling of cargoes in loading or discharging. The steam for the winches is supplied by an exceptionally large multitubular donkey boiler placed in the stockhold. The steam steering gear is of the latest design, and is placed at the after end of engine platform, and having controlling rods from wheel-house on flying bridge. There is also a powerful steam windlass with extra large warping ends on forecastle deck, right and left screw gear aft and all modern improvements. The deck erections consist of full poop, long bridge amidships, and topgallant forecastle. The accommodation for captain and officers, &c., is fitted in large and commodious houses on bridge deck, the saloon being handsomely fitted in polished hardwoods, and all the berths fitted with steam heaters. The sanitary arrangements have received special attention, a large tank being placed on deck with ample supply for flushing purposes. The seamen and firemen are comfortably berthed in a very commodious topgallant forecastle. For the purpose of trimming the vessel when light, the double bottom, which is on the deep-floor principle, has been subdivided into six tanks, while the after-peak is also fitted for water ballast. The propelling machinery, which has been supplied by Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, consists of a set of triple-expansion engines, having cylinders 24 in., 39 in., and 66 in. diameter and a stroke of 45 in., two large single-ended steel boilers, working at a pressure of 180 lbs. per square inch, and fitted with Howden's system of forced draught. After adjusting the compasses the vessel was taken a series of runs over the measured mile, and a mean speed of 12 knots was obtained. The vessel, which is in command of Captain Masson, afterwards proceeded on her voyage to America. During construction the vessel and engines have been under the supervision of Mr. George M'Farlane, of Glasgow, on behalf of the owners.

Olaf.—On March 15th the fine steel screw steamer *Olaf* left the port for her trial trip. She has been built by Messrs. William Gray & Co., Limited, to the order of Mr. L. H. Carl, of Copenhagen, and takes Lloyd's highest class. She is 290 ft. by 39 ft. 6 in. by 21 ft. Her engines are of the triple-expansion type, built by the Central Marine Engine Works of William Gray & Co. The cylinders are 21 in., 33 in., and 56 in. in diameter, with 36 in. piston stroke, steam being generated in two large steel boilers working at a pressure of 160 lbs. per square inch. There were present Mr. V. Hermann and Mr. C. A. Jorgensen on behalf of the owners; Capt. A. V. Knudsen, superintendent to the Heindal Steamship Co., and Mr. Jenkins; Captain Murrell and Mr. Lindsay representing the builders of the ship and engines respectively. The weather was very rough, which caused considerable racing of the engines, but everything worked perfectly, and on the conclusion of the trial the vessel went on to Sunderland to load.

Raglan Castle.—On March 16th the *Raglan Castle*, the Castle liner which was built by Messrs. Barclay, Curle & Co., had her trial trip. She is a screw steamer of 4,320 tons gross, and, except that she is 15 ft. longer, is practically a duplicate of the *Dunolly Castle*. Her dimensions are:—Length, 397 ft.; breadth, 46 ft. 3 in.; and depth, 30 ft. She is fitted with machinery of about 2,200 H.P. of the most improved type, on the triple-expansion principle. There will be accommodation for about 20 passengers. The vessel is handsomely equipped. There is a dining-room panelled in oak, a drawing-room, and a smoking-room, both prettily decorated. The vessel, indeed, is replete with all the conveniences of a first-class passenger steamer. The run was between the Cloch and the Cumbraes. During the trip the vessel reached a speed of 13¾ knots. Her guaranteed speed is 12½ knots. The *Raglan Castle*, which will be under the command of Captain Bryan, will probably set out on the voyage for South Africa on April 14th.

Raven.—On Wednesday, March 17th, the steam trawler *Raven*, built by Sir Raylton Dixon & Co., Cleveland Dockyards, Middlesbrough, for Messrs. The Cleethorpes Steam Trawling

Co., Limited, Grimsby, was taken out to sea for her official trials, under the command of Captain Royall. Her principal dimensions are:—Length, 100 ft. 8 in.; beam, 20 ft. 5 in.; depth, moulded, 11 ft. 8 in., and she has been built to Lloyd's highest class. Triple-expansion engines have been fitted by the North-Eastern Marine Engineering Co., Limited, of Sunderland, the cylinders being 10 in., 17½ in., 30 in. by 21 in. stroke, with a large steel boiler, working at 200 lbs. pressure. The hull and machinery have been constructed under the supervision of Mr. R. B. Kennedy, of Grimsby. At the conclusion of the trials, which were highly satisfactory, the vessel proceeded to Grimsby.

Victor.—Lately the new steam trawler *Victor*, of Grimsby, has been on her trial trip. She was built to the order of the Atlas Steam Fishing Co., of Grimsby, Messrs. Cochrane & Cooper, of Beverley, being the builders of the hull, and Messrs. C. D. Holmes & Co., of Hull, supplying the machinery. The *Victor* has been fitted with engines of 55 N.H.P. Steaming down the river and out to sea, the vessel's speed and seagoing capabilities were tested, the result being described as satisfactory to all concerned.

Institution of Naval Architects.—Summer meetings of 1897.—Mr. George Holmes, the secretary of the Institution of Naval Architects, has issued a circular to the members and associates, in the course of which he says:—"I am directed to give you the following information with reference to the summer meetings this year:—This being the 60th year of the reign of her Majesty Queen Victoria, the council have arranged that the Institution shall celebrate the event by holding an International Congress of Naval Architects and Marine Engineers at the Imperial Institute, London, in the course of the coming summer. His Royal Highness the Prince of Wales has graciously consented to act as honorary president of the congress, and will deliver the speech of welcome on the opening day. Invitations to take part in the congress have been sent to the Ministers of Marine of all the principal maritime powers of the world, to the French Association Technique Maritime, to the American Society of Naval Architects and Marine Engineers, which are institutions having kindred objects to our own. The holding of this great congress, on such a unique occasion, will give the members a fitting opportunity for welcoming to our country the many kind friends from abroad who, during the last two years, have shown us such marked hospitality, and done so much for the advancement of the Institution. The council know that they can rely with the utmost confidence on the members to support them by every means in their power in doing honour to their guests. A large and representative reception committee is in course of formation, and the council are glad to inform the members that they are receiving every encouragement from H.R.H. the Prince of Wales, from the Government, the City of London, as well as from the shipbuilding and shipowning interests throughout the country. The exact date is not yet fixed, but the meetings will probably take place early in July, and further information will be sent to you as soon as possible."

The keel of the battleship *Wisconsin* has just been laid at the Union Iron Works, San Francisco. The contract price is about 3,000,000 dollars. There are two other warships of the same size being constructed in Eastern shipyards, the *Alabama* and *Virginia*. The specific features and general dimensions of the fighters are: Length of load water line, 368 ft.; beam, extreme, 72 ft. 2·5 in.; freeboard, forward. 13 ft. 6 in.; normal displacement, 11,825 tons: main draft for the normal displacement, 23 ft. 6 in.; I.H.P. 10,000: estimated speed, in knots per hour, 16; normal coal supply, 800 tons; total bunker supply, 1,200 tons.

Anti-Attrition Metal.—Messrs. Howard, Farrar & Co., Johannesburg, have been appointed sole agents in the South African Republic for the sale of this metal.

Institute of Marine Engineers.—At the annual general meeting of the Institute of Marine Engineers, on March 12th, Mr. Fortescue Flannery, M.P., was elected president. The new president was formerly engineer-assistant to Sir Edward Reed, and is well known as a lecturer and reader at scientific associations. He represents in Parliament one of the divisions of the West Riding of Yorkshire.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

LIQUID FUEL.

To the Editor of The Marine Engineer.

Sir,—In your leader on liquid fuel in the last issue, I think the writer has contributed facts calculated to provoke defeat of his own argument. He gives us first two cases where this form of fuel has attained a certain measure of success, viz., in South Russia and on the Great Eastern Railway, and if we examine these we know that there is a surplus of oil available which must be got rid of somehow in the locality named. Turning to the second instance, it is unanswerable that the patent question has everything to do with the adoption of the system on this line, the locomotive superintendent not having an open mind on the subject.

Having had, however, some knowledge of the burning of oil on land boilers and its rejection after trial, there is the primary consideration that no great quantity of the article is available for service, even if it were of the calorific value claimed. Hence if a demand sprang up the price would rapidly rise, and this is exactly what did occur in London within my own knowledge. But there are other and more cogent reasons for its failing practically. The oil burns as a gas and is too local in its action to diffuse its heat. We know that it is necessary to have a substance for it to play upon in the furnace, generally coke, in order to obviate this difficulty; and as an instance of the trouble that may be thereby occasioned in a Lancashire boiler, 28 ft. by 7 ft., the pressure on the gauge dropped from 60 lbs. to 30 lbs. in less than 10 minutes when the stoker had his attention drawn away. The consequences of this might have been so serious that the apparatus was immediately removed, on this ground alone, though the economy obtained at the beginning of the experiment was much more than nullified by the rise in price named. Other drawbacks found were directly contrary to those stated by the writer. Soot was abundant where the spray played into the boiler, and so much was this so that when used for only a week continously a hard cake had formed on the dead plate about one inch thick, and this required a hammer and chisel to remove. It is easy to conceive, therefore, with this dross in the fuel, corresponding to clinker in coal, it would be impossible to prevent the plates of the boiler becoming coated with thin but impenetrable lining of deposit, and thus the heat might never reach the plates at all. Where, as in the case of locomotives, time is permitted every day for a good overhauling of the machine, deposit can be watched, no doubt, but with marine boilers there is no such opportunity. For myself I certainly prefer the solid mass of fuel on the grate, which the writer of your article seems to deprecate. Provided I get my air through this mass efficiently, I fail to see that I am at any disadvantage over a spray of oil—on the contrary, I have a body of fire that throws its incandescent rays in all directions for the purpose required, viz., heating the plates. Give me, then, a good coal fire on a thoroughly cleaned grate and plenty of water on the steam side of my plates, and I know that, barring accidents, nothing will go wrong. The easy stowage of oil in bunkers is perhaps the only real claim in favour of liquid fuel, and on this point, it will be remembered, we have absolutely no knowledge whatever. Like other examples in the engineering world, trials are wanted, and none have yet been made of any consequence with oil on board ship. We do know that every precaution has to be taken on tank steamers as regards the waste gases, and probably in the rough-and-ready way that obtains at sea, even in this particular alone, drawbacks would supervene that only time would show. Anyhow, I have endeavoured to prove that the economy claimed for liquid fuel does not obtain in practice, and that many drawbacks have been found from its use, experimentally, that make it not altogether a likely boon and a blessing to those who risk it in larger fields.

Yours faithfully,

Experience.

Reviews.

Water-Tube Boilers for Marine Purposes. By L. E. Bertin.

At a period when the consideration of questions relating to water-tube boilers is particularly interesting to all marine engineers, the appearance of a standard work on this subject from the able pen of M. Bertin, the chief constructor of the French Navy, is most opportune, and the fully recognized ability and high position of the author is a complete guarantee of its value. M. Bertin has such exceptional opportunities for obtaining authentic official information, which is unobtainable by the ordinary writers on this subject, that the statements, data, and formulæ contained in his book may be accepted with every confidence. The author has done so much in the past to advance the science of marine engineering and naval architecture that a statement of his qualifications as an expert on the subject of water-tube boilers and kindred matters may be regarded as somewhat superfluous. M. Bertin was for a long time the principal lecturer at the French School of Naval Engineering, and besides being the Chief Constructor at the French Admiralty, is also the author of an important treatise on the United States Navy, besides a standard work on the rolling of ships on non-synchronous waves. The present work is an epitome of his lectures and writings on boilers and engines, and is a most comprehensive summary of the various points touched upon. It bears the stamp of being the up-to-date experience of one well versed not only in the purely theoretical side of the question, but what is far more important from a marine engineer's point of view, in the most recent practical experience gained in the French Navy. M. Bertin's book deals almost wholly with results actually obtained in the French Navy, and here we think he is wise, as he could naturally not speak with the same weight and authority as to results obtained in our own and other foreign navies where he has not the *entree* to first-hand information as he has at the French Admiralty. French engineers, as is well known, have devoted special attention to water-tube boilers for some years past, and have to a great extent been the pioneers in this direction, as evinced by the fact that the British Navy have largely adopted the Belleville boiler for heavier work, and the Normand boiler for the lighter class of high-speed work. In a most clear and consistent manner M. Bertin has divided his book into four separate headings, to which he has prefixed an introduction of some three chapters dealing with the usually accepted laws relating to the use of steam at sea.

Part i. contains a chapter on coal firing, with lengthy sections dealing with natural and forced draught, descriptions of various grates and the management of fires. Another chapter on liquid or oil fuel, and a third on internal corrosion, and the dangers of grease in feed water, etc.

Part ii. treats with the construction, in great detail, of ordinary or Scotch cylindrical boilers and locomotive boilers, with sections on staying, jointing, and tubing, and the various types of furnace flues in general use.

Part iii. is wholly taken up with the description of nearly all the known types of water-tube boilers, and in our opinion is certainly the most valuable section of the book, as it contains data and details which we think are entirely new, and coincide with recent practice.

Part iv. is devoted to boiler mountings, feed heaters, vaporators, safety valves, hydrokineters, and in fact every accessory usually found in modern ships.

The work is most liberally illustrated with views and sections of great merit, and which clearly show the author's meaning. Although the space at our disposal is not sufficient to deal as exhaustively with the various sections of the book as we could wish, still perhaps a little detail will more clearly show its claims to be placed on our shelves as a standard work of reference. In the first chapter of the introduction M. Bertin deals with the important question of coal consumption and radius of action, and gives a table of great value, showing the coefficients, H.P., and displacement of several ships recently tried in the French Navy. M. Bertin also alludes to our practice in this country of measuring the evaporation by the standard from and at 212 deg. Fahr. This, he remarks, is not always accurate, as no account is taken of the dryness of the steam, and he prefers their method of measuring by the quantity of coal consumed per H.P. per hour. The regularity of firing to obtain good results on consumption trials, is, in his opinion, a matter that is apt to be overlooked, or at least whose importance is often underrated, and M. Bertin advises regular firing with stated quantities at regular intervals as being necessary to the success of economical firing, and adds some remarks on the influence of the length of the trial on the results. He also gives a short account of the introduction of boilers and their subsequent development, with the reasons which have produced the present improvements. The third chapter touches upon the various types of engines used in ships of war. In the chapter on coal firing, &c., M. Bertin gives the result of tests to determine the calorific values of various coals and the reasons which led the French Navy to discard English coal and adopt the briquette. The section on natural draft is very complete, and contains a table of the various speeds and temperatures of the gases from the furnace to the uptake. Forced draught is represented by descriptions of many different types, both English and French, and the results lately obtained by M. Normand on the *Forban* are given in detail. The chapter on liquid fuel firing is comparatively a short one, although containing descriptions of some of the older systems tried; but we cannot help thinking that M. Bertin has reserved himself on this most important point, as no doubt the oil firing of warships is the next important step of the near future, and we know that some most extraordinary results have quite recently been obtained in France in this direction.

Chapter vi. takes up the theory of the production of heat and its transmission to the boiler water in the most advantageous manner, and some interesting figures are given relating to the losses by radiation.

The section on internal corrosion is important, as it gives the means adopted in the French Navy for overcoming this difficulty to some extent, and thereby prolonging the life of tubulous boilers.

Chapter viii. deals fully with cylindrical boilers, both single and double-ended, and this section contains an interesting photograph of a pair of furnace crowns in the *Wattignies*, which collapsed right down on top of the bars, apparently without actual fracture. This section, however, contains a great proportion of information which is necessarily familiar to English readers, as their experience of the cylindrical marine boiler is no doubt peculiar and extensive. The space allotted to the consideration of loco type boilers is occupied by statements as to the reasons for their adoption, which are fully discussed. M. Bertin also contributes the results obtained from some experiments made with a locomotive on the Paris-Lyon Railway, to determine the effect of the length of tube on their efficiency as heating surface, which are most valuable. As we have already stated, the section of M. Bertin's book that he devotes to water-tube boilers is certainly the most valuable portion, and well worthy the careful study of marine engineers. All the best-known types are dealt with and illustrated, and many of the lesser known types find a place in this most unique collection—the fact that there are considerably over seventy illustrations in this section of the book alone points to its interest and importance. A beginning is made with the well-known Belleville boiler, and its history and progress is traced from the first trials of the original boiler, constructed in 1856, up to the present time. Want of space alone precludes us from touching on some of the curious types described, but they are one and all dealt with impartially, and their faults and good points candidly and lucidly discussed. The author gives at some length the reasons influencing the French Admiralty to discard the D'Allest boiler in favour of the Normand-Sigaudy type for use in some of their largest cruisers. M. Bertin has set apart a whole chapter to the all-important question of circulation, and explains the theory and the formation of steam bubbles, and their effect on columns of water passing through tubes of various diameters.

The question of the advantages and otherwise of water-tube boilers is gone into at some length, as also the price and life of various types. The tables given on these important points, together with the weights per H.P., space occupied, &c., are most valuable.

The concluding section of the book, dealing with boiler mountings and accessories, is very complete, and embraces types of all the fittings that can be found in the engine-rooms of modern warships, and upon the efficiency of which so much of the success of the boilers depend, and which occupy so much of the attention of the officers in charge.

Although many of the fittings described are at present only for tubulous boilers, no doubt they or their equivalents will in time be used for general marine purposes.

From safety valves and automatic feeds to ash shoots, and from air pumps and feed heaters to gauge protectors, we find them all exhaustively treated, and although some hail from this side of the Channel, nevertheless we confidently draw our readers' attention to M. Bertin's remarks thereon. We must take this opportunity to express our thanks to the author for his able and exhaustive work on marine boilers, which is equally valuable both to the professor of engineering and to the sea-going engineer. Although the book is at present in the original French, still we are certain that such a standard work will be efficiently translated without delay, and have the circulation it deserves.

The United States Metallic Packing Co.

We have received from the United States Metallic Packing Co., of Soho Works, Bradford, a calendar with a very handsome steel engraving of a racing cutter yacht. The design and execution of this picture are admirable, and are, we very much fear, superior to anything which is producible, at least at commercial prices, in this country. The calendar also gives some information as to the productions of the firm, and as to the extent to which these have been adopted by the public. We have, however, also received from the company two little pamphlets containing a list of a very large number of firms in every part of the country, and of very many and very important steamships of every important nation, and of every kind of occupation, which use this packing. One pamphlet is devoted to testimonials, and these are of a very convincing character. It appears that there are many instances of this packing having lasted a period of fourteen years, and yet continuing to do good service. Now that the pressures in common use have risen so high, and are still constantly tending towards higher levels, the value of a good steam packing cannot be over-estimated. And on this account a packing which is adapted for pressures up to three hundred pounds will be welcome to those who do not know of the United States Co.'s speciality. We may also mention that the company has another useful invention. This is the Bradford Portable Power Drill and Reamer, which is adapted to save labour without being cumbersome or unwieldy. It has the advantage too of being capable of use by any intelligent engineers, even if they have had no previous experience in its use, and it has frequently proved its value in the making good of breakdowns and of otherwise enabling the permanent engineering staff to avoid delay, and to save the expense of calling in outside assistance.

Reed's Polyglot Guide to the Marine Engine. Sunderland: Thos. Reed & Co.

This is an exceedingly useful book. It does for the marine engine in detail what Paasch's book does for the vessel in general. But whereas "Keel to Truck" deals with three languages, the present volume gives us another. English, French and German are, of course, included, and, in view of the large increase in the Norwegian mercantile marine and the large number of Norwegians in ships under the British flag, it was a happy thought of Mr. Reed's to add Norse to the other three. The various parts of the modern marine engine and boiler are well illustrated here, and the drawings are numbered. To these numbers will be found in the text the appropriate name in each of the four languages. Thus those who are at a loss for the English name are not debarred from using the book, and they may at the same time learn how a part is called in English and in three other important languages as well. Reference is made easy by dividing the work into sections so that the parts of the boiler, the triple-expansion engine and the paddle engine are each grouped together, whilst a separate section deals with the words of command, the signals of the telegraph and the names of the engine-room stores and tools. In addition to this there is a separate index to terms for each of the four languages. An appendix gives illustrations of the various types of ships now prevailing, and also affords much information as to the weights and measures of the countries under discussion. We understand that much trouble has been taken to secure accuracy, and as far as we are able to check it, the result is satisfactory. But we are not students of Norwegian, and we cannot therefore venture to criticise that part of the book. We recognize, however, that the idea is a good one, and that it has been well worked out, and we are confident that the book will be useful alike to shipbuilders, shipowners and marine engineers.

Tables for Constructing Ships' Lines. By Archibald Hogg, Naval Architect. Newcastle on Tyne. 1896.

We have received from Mr. Hogg—who is his own publisher—a copy of his tables for the drawing of ships' lines. These are conveniently published in book form and are accompanied by full and precise instructions for use. They have the recommendation of being worked out by a practical man and of having borne the test of experience in his own office before they have been offered to the public. They claim to be a ready method of constructing a ship's line plan so as at once to show the required displacement and the longitudinal position of the centre of buoyancy, and that without tying the naval architect who makes use of these tables to any particular curves. He can make the mid-areas as full or as fine as his object in any particular case may make desirable. The author finds that a rough body plan can be drawn out by use of these tables in some twenty minutes and that from this the deck-plans and quantities of the proposed ship can afterwards be worked out. The advantage of a system which saves time is in these days in need of no outside recommendation and the advantage of the present aid to designing will speak for itself to those who examine it.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from January 19th to February 9th. 1897.

1394 S. Allcock (A. Hintze, Finland). Tackle for fishing.
1418 J. Neil. Rocking and dumping furnace grates.
1439 A. and F. H. Pochin, and H. Addison. Clutches.
1493 P. Tydeman. Docks.
1494 S. and S. R. Chatwood. Superheating steam.
1515 C. I. Thorn. Furnace.
1538 R. G. Taitt. Signalling ships.
1552 S. A. Johnson. Steam generator.
1630 E. B. Smith. Wrenches.
1660 C. C. Dunn. Hooks for cranes.
1668 W. S. Simpson. Row-locks for boats.
1677 L. Zobel. Water-tube boilers.
1685 E. Thunderbolt. Regulating the speed of motor power engines.
1688 M. Gledhill. Forging armour plates.
1693 G. Fletcher. Water-tube boilers.
1699 T. Burrows. Utilising the power of sea waves.
1726 T. Wilson. Disengaging boat supports.
1764 A. Berry. Keeping water in boilers level.
1775 J. A. Towler. Valve gear for pumping engines.
1796 G. J. Ayling. Boat propulsion by hand.
1802 W. and A. R. Crawford. Closing bulkhead doors.
1806 A. Adams and H. W. Hill. Boiler furnaces.
1818 G. Smith. Ships' side light.
1844 J. Schöbere. Smoke consuming furnaces.
1857 E. and A. W. Bennis. Furnace bars.
1869 A. Cornez. Engines.
1890 C. Treupel. Compasses.
1897 G. J. Ayling. Screw propellers.
1944 E. G. Brewer (Tahsin Effendi and T. C. Tucker, Turkey). Slide valve gear.
1974 T. Mudd. Five-crank engines.
1988 V. Wolff and T. W. Ballard. Journal bearings.
1992 G. J. Ayling. Propellers.
1993 A. J. Boult (J. Karlsson and C. V. Lönnqvist, Sweden). Ships' logs.
1998 T. and W. L. Cole. Regulating marine engines.
2037 J. and A. Evans. Ships' anchors.
2038 R. Aitken. Engine governors.
2066 W. Chattaway and C. H. and F. J. Dale. Steam generator.
2079 A. Y. Small. Anti-friction bearings.
2080 W. Hayes. Valves.
2102 J. Murphy and T. S. Allden. Steam engines.
2112 W. H. Waud. Engines.
2124 F. N. Blanc (T. S. Crane, United States). Caulking plates.
2126 T. J. Tresidder. Heating armour plates.
2153 J. S. Hainsworth. Oar blades.
2186 W. E. Berry. Water-tube boiler.

2223 J. Ball. Otter board for deep-sea fishing.
2227 J. B. Hirschmann. Screw propellers.
2256 S. J. Robinson and S. Pope. Furnace construction.
2257 W. Bray. Cowls.
2258 T. R. Marshall, R. T. Napier, and S. Alley, Purifying feed water.
2266 J. D. Murray and J. Alston. Feed apparatus.
2267 G. Guest. Direct thrust ship's propeller.
2303 J. and C. Richardson. Rotary steam engines.
2317 W. Brothers. Steam boiler furnaces.
2318 J. Ciockie. Propelling ships.
2346 C. A. Underwood and G. F. W. Short. Signalling at sea.
2352 S. Brown. Automatic feed-water regulator.
2383 G. R. Brace. Steering gear for vessels.
2483 J. Crow. Plate-bending machines.
2489 W. D. Crabb. Valve.
2545 C. S. Forbes. Water gauges.
2555 L. Cathelincau. Renewing engine pistons.
2596 S. Lake. Submarine vessels.
2616 W. Jones. Valves.
2631 G. H. Langley. Anchors.
2636 J. C. R. Okes and A. Stubbs. Steam traps.
2638 J. Smith. Packing for piston rods.
2650 S. and S. R. Chatwood. Superheating steam.
2679 W. E. Simpson. Internal combustion engines.
2703 T. Drummond. Cowls and ventilators.
2714 H. Workman. Boilers.
2743 F. L. Horspool. Furnace doors.
2747 E. Texier. Screw-propeller.
2788 H. H. Lake. (G. W. Brown, United States). Stopping engines.
2830 J. V. Paterson. Ships.
2847 W. G. Heys. (Schaffer and Budenberg, Germany.) Valves.
2859 T. Priske. Ascertaining draught of water of ships.
2866 S. Gresswell. Propelling ships.
2868 J. Gore. Steam boilers.
2871 J. W. Spencer. Armour-plates and projectiles.
2873 W. Langdon-Davies. Alternating currents.
2899 T. Rimmer and J. W. Exley. Oars and sculls.
2915 Rose, Downs, and Thompson, Limited, and J. H. Hopwood. Water-tube boilers.
2937 J. R. Booker. Corrugated flues.
2963 J. R. Lang. Valve.
2964 J. Bromilow. Sight-feed lubricators.
2989 T. and G. Wilton. Forced draught furnaces.
3016 P. J. Clibborn. Saving life at sea.
3026 J. B. Von Wenusch. Removing ashes from boiler flues.
3027 Sir C. S. Forbes, Bart. Condensers.
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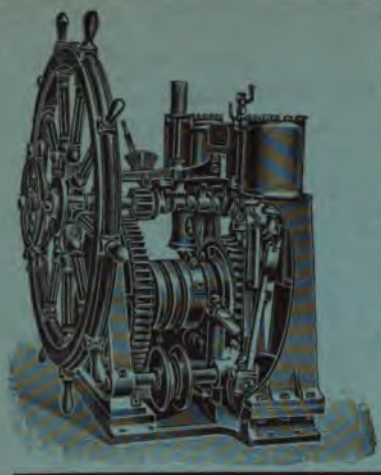

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The Marine Engineer.

LONDON, MAY 1, 1897.

AT the thirty-eighth session of the Institution of Naval Architects on April 7th, A. J. Durston, Esq., Engineer-in-chief of the Navy, led off the reading of papers with an exceedingly modest statement of the undoubtedly successful trials of the *Powerful* and *Terrible* cruisers. We will not enter into details of the facts communicated in that paper as we print it *in extenso* elsewhere, contenting ourselves only with emphasizing the startling results proved by the trials that the I.H.P. per ton weight of boilers in the *Powerful* and *Terrible* is 56 per cent. better than in the case of three recent battleships with the old cylindrical boilers. The dramatic effect of Mr. Durston's quiet facts was greatly enhanced by the supplementary paper on water-tube boilers in warships, read immediately after that of Mr. Durston by Rear-Admiral C. C. P. Fitzgerald, and the complementary nature of this paper to the former was so thoroughly felt by the meeting that the discussion on Mr. Durston's paper was deferred until after the reading of Rear-Admiral Fitzgerald's paper. The gallant Admiral very properly put to the meeting the views of an executive officer as to what desiderata would be sought from a boiler eminently adapted for a warship, and frankly admitted that, though desirous of being severely unbiassed as regards water-tube boilers, he could see no comparison between that boiler, as a type, and the old cylindrical boilers with which he had been familiar, as regards rough handling and rapid changes from high generation to even drawing of fires and *vice versa*, or as regards promptitude in the getting up of steam upon emergency or rapid change of speed. The discussion which followed on these papers jointly, but emphasized the important effect that has been produced upon the minds of all thinking people, executive officers, engineers, and scientists alike, by the successful trials of the *Powerful* and *Terrible*, though it is of course, admitted by all that we may not yet have seen the best development of the water-tube boiler for war purposes. It must be remembered that, although the Belleville boiler was not a new boiler, its adaptations on a large scale to powerful war vessels is a new experiment with us, and though highly and in some quarters unexpectedly successful, there may be much yet to be learnt and modified in water-tube boilers adapted for such a purpose. In the discussion upon the above two papers taken together, Mr. Thornycroft, though fully concurring in all that had been stated as to the advantages of water-tube boilers, felt that as eleven years had elapsed since the first boiler of the Speedy type had been introduced into the Navy by the instrumentality of his firm, this might have been mentioned to their credit. Of course, amongst the very favourable commendations of the subjects of these papers, it was only to be expected that some criticism should be made as to the dangerous overlaudation of the system of water-tube boilers and of the Belleville boiler in particular, and Messrs. Moss, Gross and Howden did battle for the, at present, unrecognized virtues of the cylindrical boiler as compared with the tubulous boilers. Sir Edward Reed and Mr. Manuel were, however, strong champions in support of Mr. Durston's pluck and foresight in making so great an innovation in the largest cruisers, and in defence of the careful standard tests and preliminary investigations made by the Admiralty before and after putting in hand so daring an innovation.

SEEING the general interest that is being taken at present in the stability of vessels, and that it is even suggested from influential quarters that shipmasters should be required to have an approved knowledge of the subject, the paper contributed by A. G. Ramage, Esq., to the I.N.A., upon a simple mechanical apparatus to experimentally ascertain the stability of any given sections at various angles of heel, is sure to be of interest to all. The principle involved in the apparatus are a mode of raising and lowering a model of a ships' hull composed of a series of sections, in yellow pine, fixed together to represent the complete hull, and means of fixing the vertical axis of the model hull at any required axis of heel. An experimental curve of stability momenta can readily be set out if the centre of buoyancy, that is the centre of gravity of the water displaced, can be ascertained from such model. To ensure accuracy in such results it is essential that the gross displacement of water must be the same for each angle of heel as for the vertical position. This is accurately gauged by a surface float, which indicates the total displacement of the model by an equivalent rise in the water level of the small tank in which the experiment is conducted. The movement of such float is multiplied forty times upon an indicating finger to give sensitiveness. To ascertain the centre of buoyancy for any specific heel, the model is immersed, at such heel, until the normal displacement is indicated. The water-line is then marked on the model and the immersed sections removed by a fine saw. The centre of gravity of such immersed sections, which can be ascertained by trial by balance, will give the centre of buoyancy of the immersed section, and thus the whole curve of stability can be set up at various heels. As a rough-and-ready means for very rapidly setting out the curve of stability which might

be done by any careful and unscientific experimenter, this apparatus was thought by the meeting to be very useful.

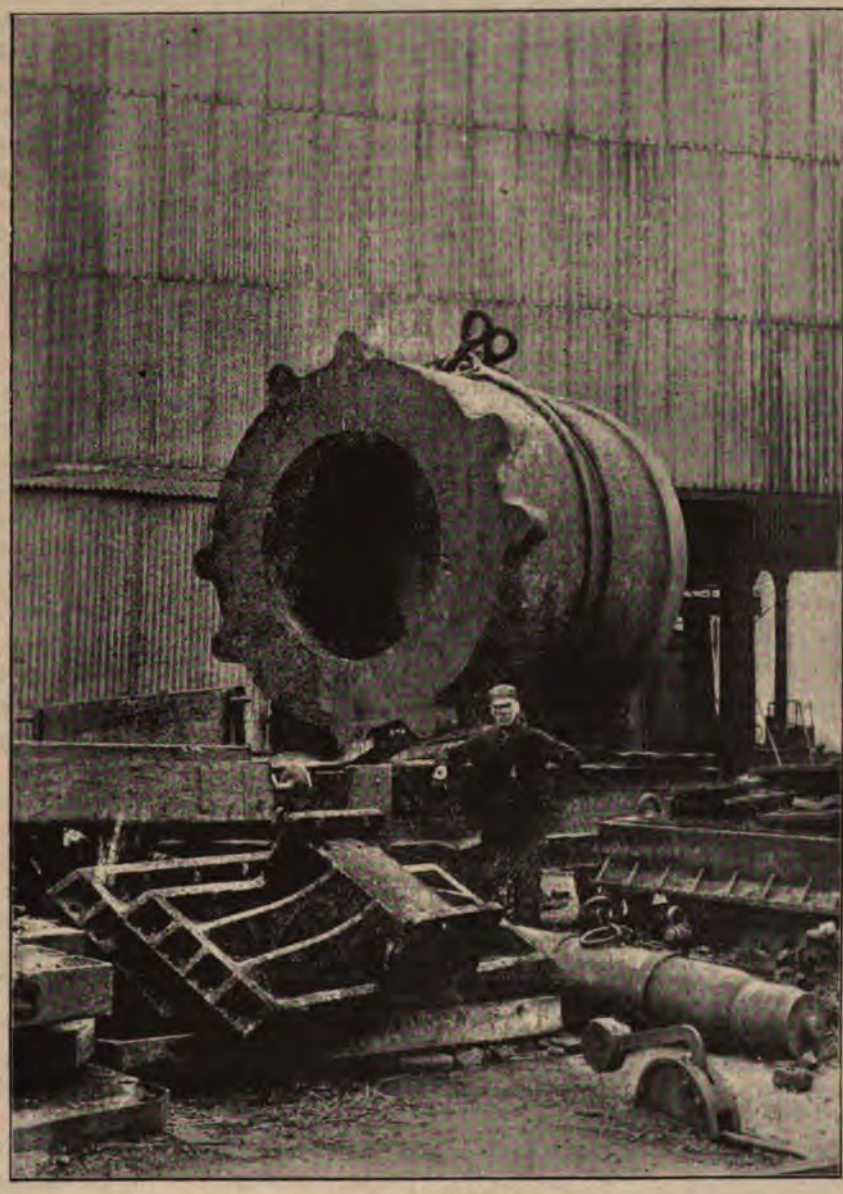
Lord Charles Beresford was again essentially practical and to the point in his paper upon the "Fighting value of certain of the older Ironclads if Re-armed." We have some 8,000,000 to 10,000,000 pounds worth of old ironclads fit enough in themselves for considerable service yet, and Lord Charles submits what appears to be a perfectly logical deduction, that if they are worth considering at all as part of our effective or Reserve Navy, it is surely worth while to arm them effectively with modern and quick-firing guns, so that when they did find an enemy they might give a good account of him, and such re-arming was estimated to cost about a million. The adverse criticisms were upon the points that these vessels were not of modern speed, and were such coal-eaters as not to have long coal endurance. But this hardly affects, to our mind, the essence of Lord Charles' proposition, that if useless owing to such deficiencies why keep them on the reserve list at all, and in such case are we prepared to write off 17 or 18 ironclads at once as obsolete? If, however, as the authorities evidently think, and as many others concur, valuable service can be found for them, even with their drawbacks of limited speed and coal endurance, then at least let them be efficiently armed. It was remarked also by Sir Edward Reed, in support of the proposition, that this would at least provide an immensely useful reserve of modern guns which would be equally useful for future vessels as if specially made for them.

The steam-turbine has been making a record in the driving of a high speed torpedo-boat, having given 72 H.P. per ton of total machinery and a fastest run of 32·61 knots per hour. This was the subject of an interesting paper before the I.N.A. communicated by the Hon. Charles Parsons. Unfortunately for his hearers, Mr. Parsons gave little detail of his engines or of the specific construction of the *Turbinia* and its propellers, which, however, we shall hope to have hereafter. The substitution of a rotary engine, though revolving with its propeller shaft at over 2,000 revolutions per minute, for a reciprocating engine, seems at any rate to have entirely solved the question of high speed in a slight hull without sensible vibration, and this alone is a great achievement, even with some loss of economy. But one's interest in the matter is enhanced when it is found that the consumption of steam per I.H.P. is only 15·86 lbs. There was a unanimous concurrence of opinion amongst those best able to judge that this paper might prove to be an historical communication, that is, marking an epoch of a new departure in rotary engine marine propulsion. On Saturday, April 10th, the *Turbinia* attained the highest velocity ever reached by a steam vessel, making an average of 32¾ knots on the measured mile.

As geometry is the basis of successful shipbuilding, it is as a matter of course that some of the papers read before the I.N.A. should deal with geometrical solutions of common problems in the designing of the vessels or their engines, or for the purpose of better exemplifying the principles involved in them. Of this character were a paper upon the "Use of the mean Water-line in designing the lines of Ships," by A. G. Ramage, Esq., and two papers on "The Accelerity Diagram of the Steam Engine," and on "The Geometry of Stability," by J. Macfarlane Gray, Esq. In the former paper, Mr. Ramage suggests a method from a series of tabulated numerical co-efficients deduced by great personal labour in analysis under all various conditions of fineness of displacement, giving equivalent co-efficients of load water-line area, of area of midship section, and of the height above top of keel of the mean water-line corresponding to a certain co-efficient of fineness. The use of this table is suggested as the means of obtaining at once a mean water-line which shall be very nearly correct, and will enable the sketching in of sections with sufficient accuracy to prevent their constant rubbing out, as in the usual trial and error system. In the latter papers it is difficult to give any clear conception of their subject without the accompanying diagrams for reference; suffice it therefore to say that the scientists present were most complimentary to their author as to the simplicity and ingenuity of the diagrams to represent their desired objects. That of the first-mentioned paper was to give to shipmasters a simple constructional diagram representing the true relations between the period of a double roll, the radius of gyration and meta-centric height, and the length of an equivalent pendulum, and this with a view to meet the possibility that shipmasters may be required to have a proved knowledge of these subjects. The second of Mr. Macfarlane's papers we can only characterise as a masterly diagrammatic resolution of the reciprocating and centrifugal momenta of the various moving parts of a marine engine, and fully worthy of the praise freely given to it by appreciative members of the Institution.

Acetylene gas as an illuminant is now attracting much attention on shore, and it has consequently been thought of interest by Professor B. Vivian Lewes to give the Institute of Naval Architects full information as to

the character of this gas and the light it gives, as being probably applicable to a large number of purposes on ship-board, particularly in yachts where there is no electric light, and where a brilliant white light would be appreciated. Unfortunately there are certain drawbacks to this gas as regards danger of explosion where its peculiarities are not well understood. It is produced by the action of water upon a calcic carbide, which is now manufactured at a commercial rate. If such calcic carbide be shipped as the source from which the gas is to be obtained it must be carried in air-tight, and of course water-tight, drums, as even a moist atmosphere has power to somewhat decompose the calcic carbide and generate the acetylene gas This gas, when mixed with air, as in the case of the other hydro-carbon gases, forms a highly explosive mixture, and is also poisonous. Assuming, however, that proper precautions are taken in the storage of the calcic carbide, the generation of the gas by the addition of water is so simple that a simple apparatus only is needful. It would, however, be impossible to use an ordinary water-sealed gasometer for its collection on board ship. It is therefore suggested that the gas might be compressed into a liquid state, as in the case of carbonic acid gas, in steel bottles, and could be thus carried safely, and would be ready for use at any



NICKEL STEEL. (*See Editorial Note, page* 40.)

time under the control of stop-cocks. If allowed rapidly to escape the gas, however, issues at an extremely low freezing temperature, but by the use of a reducing valve or valves this difficulty might be avoided. The light of acetylene gas when burnt is most brilliant, being 15 to 20 times more brilliant for equal consumption than coal gas. As regards its penetration through fog, it has been found that the yellow coal and oil flame loses least percentage of light in penetrating such fog, acetylene gas comes next and is infinitely better for penetrative powers, under such circumstances, than incandescent gas envelopes, such as Welsbach's, or than the electric light. The gas can be used as a motive fluid by explosion, and gives a flame of a high temperature in an atmospheric burner. It is therefore possible that we might see in the future a yacht or torpedo-boat driven by an acetylene gas-motor, with acetylene search and other lights and acetylene cooking stoves, and even an acetylene torpedo. These are, however, dreams of the future. For present use it would be well applicable to floating buoys, as a cylinder with a capacity of 1·75 cubic feet of liquid acetylene would give a clear white light of 32 candles for one month. As also certain calcic carbides will ignite spontaneously when in contact with water, probably owing to the presence of calcic phosphide, the mixture might be used with advantage owing to its brilliant light as signal lights with life-belts, torpedoes, &c., igniting spontaneo usly when thrown into the water.

Nickel steel has already earned a high place as armour plates for ironclads, but W. Beadmore, Esq., submits to the Institute of Naval Architects that it has a much wider field of excellence and value in all cases where mild carbon steel is at present used. It can be worked and welded without any special care on the part of the artizan, and is a metal that will enable the scantlings of iron vessels to be reduced, will reduce the weight of the boilers and of the propeller shafts with perfect reliability as to strength, elasticity, and non-corrosion. From tests, it appears that the elastic limit of nickel steel is equal to the ultimate strength of ordinary carbon steel, and is without the dangerous brittleness of the latter. Nickel steel can be punched and bent quite as successfully as ordinary steel, and will have at the same time much higher tenacity. Curiously enough the Japanese are reading us a lesson in their prompt adoption of this material not only for armour, but for crank propeller shafts, connecting rods, and other forgings. The *Paris* has adopted a new propeller shaft of this material with a tensile strength of 90,000 lbs. (40 tons) per square inch. In power to resist corrosion, also, nickel steel takes the first place. From experiments the relative loss of weight under the same circumstances has proved to be—nickel steel, 1·36 per cent.; mild steel, 1·72 per cent.; and iron, 1·89 per cent. A striking feature claimed for nickel steel is also that a crack will not develop in it as in carbon steel, and this characteristic of ordinary steel is said to be the cause of many casualties. The fracture of nickel steel is fibrous not crystalline, as in steel, its breakage is therefore gradual and not short as in steel. As a casting, also, nickel steel maintains its reputation, the diagram appended shows a casting of 34 tons for a 12,000 ton hydraulic press cast of nickel steel, from which samples when annealed gave an elastic limit of 25 tons per square inch, being 60 per cent. of the breaking strain.

Owing to the great increase in the size and weight of pieces that have to be machined, it is the tendency now to bring the tools to the work. It is believed by Herr F. Von Kodolitsch, in his communication to the Institute of Naval Architects, that electrically driven tools will rapidly supersede all others, owing to the facility with which such tools, self-contained with their own motor, can be moved about. As an instance of this, Herr Kodolitsch states that he applies a light punching and shearing electrically driven machine to the upper deck of a large cargo boat and thus does all the light plating *in situ*, and he also finishes a large cylinder boring, planing, drilling, tapping, and studding it as it stands by numerous small electrical machines. He gives particulars of a great variety of portable electrically driven machines for all shipbuilding purposes, such as angle iron punching, bolt hole reaming, cylinder boring, pumps, winches, rotary saw, tapping, lagging, studding, tube expanding, and side light cutting machines, all of which seem admirably adapted to the purpose.

Judging from the discussion at a recent meeting of the Institute of Marine Engineers, upon "The Steam Engines and Boilers (persons in charge) Bill," the members seemed to be of the opinion that those responsible for it in Parliament had not by any means properly threshed out the provisions of the same. It was resolved, therefore, to remit to the Council the results of the meeting so that the various clauses might be further dealt with before the Bill became law. The Act aims that, with certain exceptions, boilers now not already provided for shall only be in charge of persons possessing some certificate of competency to control their safe working, and as far as the marine service is concerned, this would refer to vessels not having passenger certificates. Under the Merchant

Shipping Acts, these last must of necessity carry officers who have qualified by examination. Here, however, the proposed Bill is ambiguously worded. Clause 4 *inter alia* says:—"This Act does not apply to any boiler or engine used on board a steamship having a certificate from the Board of Trade." These terms are vague and misleading, and though perhaps drawn up with the best intentions, shew how loosely changes are made by our Parliamentary representatives. Nearly all British vessels possess a certificate from the Board of Trade, but this does not infer that those in charge have certificates. If, therefore, the Bill were passed as it stands now, we should just be about where we were previously in this respect, and it was suggested that an alteration should be made in the clauses so that it reads:—"This Act does not apply to any boiler or engine used on board a steamship having a passenger certificate from the Board of Trade." The substitution of the word "passenger" before the word "certificate" makes a great difference to the signification, because in the reading as it stands in the first case the Act would not apply to any steamship at all, the majority being passed by the Board of Trade, and therefore the idea with which it was, no doubt, framed, would be immediately stultified except for passenger steamers. It is astonishing how such an error could have crept in with such an important matter. Is it the gentlemen in the House of Commons who are in charge of the Bill, or is it the technical officers of the Board of Trade who are to blame? The intention is well enough and summed up it means to say, here are a number of boilers, which the Board of Trade has certified to be efficient in every way, yet at present there is no law which compels those boilers to be looked after by men recognised as competent for the duty. These vessels being as much in harbour, probably, as they are on the high seas, are therefore from these reasons a constant source of danger on entering and leaving port. To remedy this state of things, therefore, the Act should be made to apply to all steamships, and it would certainly appear that if men with land boilers to supervise must be above the average standard of intelligence, some such rule should also apply to those in charge of steamship machinery.

A POINT was raised at the meeting, as to the possibility of an extra grade for engineers surmounting the difficulty as far as the mercantile marine is concerned. First and second class certificates being already in existence, why not institute a third and inferior position to the other two? Presuming the new Act to come into force so that engineers on all boats are compelled to make some show, then another class would meet the case, because the persons comprising it would only be eligible for the lower types of steamers. There the matter rests for the present. The Act is likely to be brought into force for ordinary land boilers, and the consensus of opinion as expressed at the recent meeting seemed to be in favour of its extension to all steamers. Competitive examinations reign supreme in all walks of life at the present day, why should not engineers in charge of marine engines be subject to the system? for under the new Bill that is what it would mean. Modified as suggested and passed by Parliament, no one who had not come up to a certain test could obtain employment in an engine-room. It would be difficult, we think, to define the exact limits of such a Bill, but if the main features were accepted by the Committee, no doubt the details might be settled afterwards, and here again the Institute of Marine Engineers would probably have something to say.

INSTITUTION OF NAVAL ARCHITECTS.

THE 38th session of the Institution of Naval Architects was opened on April 7th, in the Hall of the Society of Arts, John Street, Adelphi. The President, the Earl of Hopetoun, occupied the chair.

The usual formal proceedings having been gone through, Mr. George Holmes, the Secretary, read the annual report of council, which was in the following terms:—

The council is pleased to be able to report on another year of satisfactory work and progress. The finances of the Institution as is proved by the statement of receipts and expenditure, continue to be in a good condition. During the year 134 new members and associates were elected, and the losses by death and resignation during the same period amounted to 21, leaving a gain of 113.

As was announced at the last spring meetings, the council accepted a very cordial invitation from a committee presided over by Herr Laeisz, the chairman of the Hamburg Chamber of Commerce, to hold its summer meetings in that important seaport. The Imperial German Government, hearing of the projected visit, sent an invitation, through the German Ambassador in London, to the Institution to extend the visit to Berlin. The invitation was at once accepted, and the summer meetings were accordingly held in Hamburg and Berlin in the month of June. The Hamburg Reception Committee and the Hamburg American line, not content with receiving us in their city, showed the warmth of their welcome by sending the Transatlantic liner *Furst Bismarck* to the Thames to fetch over the members in a body. On their arrival in Hamburg they were welcomed with every demonstration of kindness and hospitality. A meeting for the reading and discussion of papers was held at Ludwig's Concert House. Visits were paid to the harbour, and to the shipbuilding works of Messrs. Blohm & Voss, and the Institution was entertained by the Senate of the city of Hamburg in the Town Hall, and by the Reception Committee at Blankenese on the Elbe. On their journey from Hamburg to Berlin special arrangements were made by the Direction of the State Railways for the convenience and comfort of the members.

During the stay of the Institution in the German capital, everything that the spirit of hospitality could suggest was carried out by the Imperial Government, and by the Reception Committee, to render the visit instructive and agreeable. The Technical High School and one of the theatres at the Industrial Exhibition were placed at our disposal for the reading of papers. His Majesty the Emperor William II. honoured the Institution, and gave proof of the deep interest which he takes in naval architecture, by being present at the opening meeting in the Technical High School, and by listening to the reading and discussion of the papers. His Majesty also invited the whole Institution to visit him at the new Palace at Potsdam, and entertained the members in a manner which they can never forget

The Imperial German Government, represented by their Excellencies Dr. von Botticher, the Secretary of State for the Interior, and by Admiral Hollmann, the Secretary of State for the Navy, the joint Presidents of the Reception Committee, were unwearying in their efforts on our behalf. They undertook all the arrangements for our reception, and gave the Institution a magnificent entertainment at one of the Royal opera houses. A committee of representatives of Berlin commerce and industry invited the members to visit the Industrial Exhibition, and entertained them there with the utmost hospitality.

At the invitation of the Direction of the Vulcan Co., the Institution visited their shipbuilding works at Stettin. A special train was placed at our disposal. The visit was most interesting and instructive, and the members were received at Stettin with the same hospitality and good feeling which were everywhere shown to them. On the return journey to England the State Railway Co., and also the other foreign and English railroad and steamship companies, gave the members every possible facility and large reductions in fares.

The best thanks of the Institution are due to His Majesty the German Emperor, to the Imperial Government, to the Senate and House of Burgesses of the city of Hamburg, to the two Reception Committees, to the Direction of the State Railways, to the Hamburg-American line, to the Vulcan Co., and to firms and Corporations above-mentioned, for their generous welcome, and for the trouble which they took to render the visit of the members to Germany instructive and agreeable.

This being the sixtieth year of the reign of Her Majesty Queen Victoria, the council have arranged that the Institution shall celebrate the event by holding an International Congress of Naval Architects and Marine Engineers at the Imperial Institute, London, in the course of the coming summer. His Royal Highness the Prince of Wales has graciously consented to act as Honorary President of the Congress, and has been pleased to intimate his intention of being present on the opening day. Invitations to take part in the Congress have been sent to the Ministers of Marine of all the principal maritime Powers of the world, to the French Association Technique Maritime, to the American Society of Naval Architects and Marine Engineers, which are institutions having kindred objects to our own.

The holding of this great Congress, on such a unique occasion, will give the members a fitting opportunity for welcoming to our country the many kind friends from abroad who, during the last two years, have shown us such marked hospitality, and done so much for the advancement of the Institution. The council know that they can rely with the utmost confidence on the members to support them by every means in their power in doing honour to their guests. A large and representative Reception Committee is in course of formation, and the council are glad to inform the members that they are receiving every encouragement from H.R.H. the Prince of Wales, from the Government, the City of London, as well as from the shipbuilding and shipowning interests throughout the country.

The council have had great pleasure in awarding the Gold Medal of the year to Herr A. Dietrich, Constructor-in-Chief of the German Navy, for his excellent paper, "Development in the Design and Construction of German Men-of-War;" and an extra Gold Medal to Herr F. Andreas Meyer, Engineer-in-Chief of the City of Hamburg, for his paper on "The Maritime Position and principal Features of the Port of Hamburg." They have also awarded a premium to Mr. J. Bruhn for his paper, "Some Geometry in Connection with the Stability of Ships."

The council have to deplore the death of one of the vice-presidents of the Institution, Admiral of the Fleet Sir Alexander Milne, G.C.B.; of a recently retired vice-president, Sir James Ramsden; and of Mr. Theodore Wilson, an honorary member, and late Chief Constructor of the United States Navy. They also much regret to announce the sudden death of Mr. A. Blechynden, who had only recently been elected one of the representatives of the Institution on the Committee of Shipbuilders and Engineers appointed to assist the Marine Department of the Board of Trade; and of Mr. Crossland, a former member, and for some time a chief constructor at the Admiralty.

THE PRESIDENT'S ADDRESS.

The Earl of Hopetoun then delivered his opening address. He said:—I am very glad to be able to congratulate the Institution upon the report which has just been read by the secretary. It is, in every sense of the word, a prosperity report, and it is pleasant reading to all those who wish us well, for it tells them that we are, as a society, a live, healthy, growing concern; one very encouraging feature, too, at the present moment is the very large number of new members and associates who have joined (or are about to join) the Institution. There are over one hundred names on the list, of these no less than 38 are foreign gentlemen; which shows that our importance as a cosmopolitan and international body is annually increasing, and also, perhaps, demonstrates in some degree the benefits which have accrued to our constitution from our recent visits abroad.

I had the honour last year, when addressing you upon a similar occasion to this, of reminding you of all the hospitality which we had received in the previous year from the French Government and from leading citizens in France. I had not the good fortune to be present with you then, and I was only able to speak from hearsay and documentary evidence. But to-day it is different, for I went with you to Germany last summer, I shared with you in the good measure of kindness and hospitality, pressed down and running over, which was bestowed upon you, and I am therefore privileged to share in the feeling of warm gratitude which you have towards our hosts, and, in common with you, to treasure in my mind the recollection of the happiest and most interesting and most instructive week that it has ever fallen to the lot of a body of men to enjoy.

For His Imperial Majesty the German Emperor this Institution must always entertain the profoundest respect and liveliest gratitude, for His Majesty has made it clear to the world that he appreciates the good work which it has done and is doing in the cause of science. The interest and confidence which His Majesty has been pleased to evince towards us, will, I am sure, not be misplaced, but will encourage us to try and deserve his good opinion in the future to the utmost of our capacity.

To His Majesty's Imperial Government, and to those of his distinguished subjects with whom we were brought in contact, both in Berlin and Hamburg, we owe a heavy debt of gratitude, and the recollection of our indebtedness to them is as fresh in the minds of all of us as though our visit to Germany had taken place last week instead of nearly twelve months ago. I now leave the history of the past, pleasant as the contemplation of that history is, and turn to the future.

We have every reason to hope that the great International Congress which we intend to hold as a celebration of the sixtieth year of our beloved Sovereign's reign will be an entire success. Owing to the labours of our indefatigable secretary, the preparations for this great gathering are in a very forward state, a very large number of invitations have been issued, and a very large proportion of the distinguished gentlemen so invited have signified their intention of being present. It is specially encouraging to be able to state that every one of the official invitations sent to the Ministers of Marine of the principal maritime Powers have been replied to in the affirmative. We are most fortunate in having secured the countenance and support of H.R.H. the Prince of Wales. His Royal Highness, with that gracious benevolence which characterises his attitude towards all useful movements, has consented to act as Honorary President of the Congress. We may congratulate ourselves, too, upon the fact that we may count upon the support of Her Majesty's Government and of the Lord Mayor of London, as also upon that of the great body of shipbuilding and shipowning firms throughout the country.

I know full well that every member of the Institution will do his utmost to make the Congress a big success, and that each one of us will feel that his individual honour, as well as the honour of the society as a whole, is at stake in trying to return to our hosts of the last two years some measure of the immense kindness and boundless hospitality which has been so freely lavished upon us. I am aware how generously members have already responded to the appeal made to them by the council some months ago. I trust I may not be considered to touch on delicate ground when I say that I count myself fortunate in being associated with a body of gentlemen so public-spirited, so liberal-minded, and so open-handed as are the members and associates of this Institution.

With regard to the shipbuilding programme of the Admiralty for the coming year it is difficult to say much. We are aware that four new battleships and three third-class cruisers are to be laid down, but it would seem that nothing is as yet settled as to the type to which the battleships are to belong. They will probably be either of the *Canopus* or *Majestic* class. At first sight this would seem a very modest programme, but we must not lose

eight of the fact that a very large number of vessels are at present in course of construction. During the financial years 1897-8 the following vessels will be either building or completing:—

Fourteen new battleships.
Eight first-class cruisers.
Nine second-class cruisers
Two sloops.
Four twin-screw gunboats.
Fifty-two torpedo-boat destroyers.
Eight light-draught steamers for special service.
One Royal yacht.

Thus the total number of vessels under construction will be 108; their aggregate displacement will be 380,000 tons; and their aggregate H.P. will be 800 000 of I.H.P.

A very strong contingent of powerful ships has been added to the Navy during the past year. It is highly satisfactory to us to know that these ships have fully realized the most sanguine expectations of those who were responsible for their designs. In point of speed, sea-worthiness, and stability they have proved an entire success.

A very important event has recently taken place in connection with our war fleet. I refer to the entire success which has attended the trials of the water-tube boilers in our leviathan cruisers. There was, as we all know, considerable nervousness in many quarters as to the expediency of taking this so-called leap into the dark upon so large a scale. But the Engineer-in-Chief of Her Majesty's Navy was not afflicted with any of this nervousness. He knew what he was about; he had the courage of his opinions; and events have proved that he was justified in the course which he took. We, who are Mr. Durston's friends and admirers, offer him our respectful congratulations upon the good fruit which his firmness and forethought have borne.

Curiously enough, although these water-tube boilers are proving such an entire success in our warships, they have not as yet found much favour in the Mercantile Marine. Possibly the very qualities which make them so suitable for men-of-war are less desirable in trading vessels.

It may be that the water-tube boiler which combines all the qualities essential to both classes of work remains to be invented; at any rate, only a few cargo vessels have as yet been fitted with water-tube boilers, and in one case they have been removed and ordinary boilers substituted.

The largest vessel fitted during the past year with these boilers is the s.s. *Kherson*, built by Messrs. Hawthorn, Leslie & Co., for the Russian Volunteer Fleet. I believe that her trials have been entirely satisfactory.

The tendency with ordinary boilers is to steadily increase the pressure per square inch, 200 lbs. being used in many cases. Two new mail steamers of large dimensions are being built upon the Clyde, the pressure in whose boilers will be 205 lbs. to the square inch. During the year a cargo vessel, the *Inchmona*, built on the North-East Coast, has commenced work. Her engines are quadruple-expansion, with five cylinders, and her boilers, which are of rather small diameter, work at a pressure of 255 lbs. per square inch. I am told that this is the highest steam pressure as yet used in marine engines, yet these engines and boilers give, I believe, unqualified satisfaction.

Since the beginning of this year the *Pennsylvania*, 13,726 tons, built at Belfast for German owners, has commenced running in the North Atlantic trade. In point of tonnage this vessel is the nearest approach yet made to the *Great Eastern*, which measured 18,915 tons. The *Pennsylvania* has a length of 560 ft., as compared with 678 ft. for the *Great Eastern*, and 601 ft. for the *Campania* and *Lucania*.

The White Star line have recently published some particulars of the new liner *Oceanic*, which is under construction for them, and which, while not quite equalling the *Great Eastern's* tonnage, will exceed her length by 25 ft. The *Oceanic* is to have a gross tonnage of more than 17,000 tons, a length of 704 ft., and a sea speed of over 20 knots. It is expected that she will be launched in January next. She will be able to steam 23,000 knots, or practically round the world, at 12 knots speed without coaling.

At the end of last year four steamers of over 10,000 tons each were under construction in Germany for German owners, as compared with only two such vessels in the United Kingdom.

Practically, half the sea-going tonage of the world is owned in the United Kingdom, and considerably over half sails under the British flag. This maritime predominance of our Empire is all the more important because it occurs mainly in respect to steam vessels.

It will be interesting to note that the vessels on the register of the United Kingdom on December 31st, 1896, were as follows:—

Steam...	...	8,530 vessels of	10,242,192 tons gross,
Sailing	...	12,265 ,,	2,902,021 ,,
Total	...	20,795 vessels of	13,144,213 tons gross.

During the last decade the number of vessels on the register has decreased by over 1,800 vessels, while the tonnage has increased by no less than 3,340,000 tons. During the same period newly-built steamers to the extent of more than 7,000,000 steam tons have been added to the register. This circumstance indicates that the greater part of the British Mercantile Marine is of efficient modern construction.

One feature of the last few years has been the increasing proportion of tonnage built in this country to the order of foreign owners. As much as 30 per cent. of the total output of 1896 was built to the order of foreign and colonial owners. Germany provided in that year the largest amount of work for British shipbuilders (so far as foreign orders were concerned), namely, 30 vessels of 117,870 tons (over 10 per cent. of the total output). Russia followed with 23 vessels, 34,524 tons (or nearly 3 per cent.). Next came Norway with 28,303 tons (2·4 per cent.). Denmark and Japan each took about 24,600 tons at the close of 1896. More work was in hand for Japan than for any other foreign country on December 31st last year, 62,000 tons (besides two first-class battleships) were being built for that country. Vessels, too, of considerable tonnage are now being built in Japan, three steel steamers varying from 1,492 to 5,790 tons, besides several smaller vessels, being reported as under construction.

One of the most interesting features connected with mercantile shipbuilding is what we may describe as the development of type in cargo steamers. The latest contribution to this process of evolution is the appearance during the past year of the trunk-deck steamer, the peculiarity of this design being the fitting of a continuous straight-sided erection on the upper deck of the vessel. Three such steamers have been built, each of about 2,600 tons gross, and seven more are under construction.

The general impression is that sailing vessels are doomed, and that in the course of a few years they will disappear altogether—at least, so far as ocean voyages are concerned. This may or may not come to pass in this country, but in France the tendency is in the opposite direction. In 1893 a law was passed in that country for the encouragement of shipbuilding and shipowning. Under this law a bounty of £2 12s. per gross ton is payable on all iron and steel vessels built in France; a bounty of £6 per ton on the weight of all new machinery, boilers, &c., built in France; and an allowance of 11d. for French steamers, and 1s. 4½d. for French sailing vessels, *built in France*, per gross ton for every 1,000 miles run. The "running" bounties decrease 3½ per cent per annum, and cease after ten years. Of course, as compared with an English builder, a French builder is handicapped by the high cost of material due to protective taxation. Even with the help of the bounty, to build a large sailing vessel in France costs the owner nearly half as much again as to build her in this country. But the large "running" or navigation bounties obtainable on native-built vessels induce the French owners to put up with the large initial outlay.

The result of this law has been a remarkable development of the building of large steel sailing vessels in France. The production of steamers has not been noticeably affected. The bounties being based upon the gross tonnage, modes of construction have been encouraged which make that tonnage very high as compared with the net tonnage.

In 1892 the sailing tonnage launched in France did not exceed 2,000 or 3,000 tons. The figures have since gradually increased until in 1896 no less than 32,568 tons were launched. Moreover, at the end of 1896 steel sailing vessels to the amount of 41,000 tons were under construction and preparing in France, as compared with 36,000 tons in the whole of the United Kingdom.

The first paper on the programme this year is by Mr. Durston, the Engineer-in-Chief of the Navy, on the recent trials of the cruisers *Powerful* and *Terrible*. This record of the results of introducing Belleville boilers on an unprecedented scale into ships of the Royal Navy will be of great interest to all of us.

have already alluded to this subject in an earlier part of my address.

Admiral FitzGerald also deals with water-tube boilers in warships, and in so doing he fulfils one of the main objects of this Institution, which is to promote the interchange of opinion between the users and constructors of ships and engines. In any case, the opinion of a competent and experienced Naval officer on the relative values of the two great types of boilers from a combatant's point of view cannot fail to be of interest.

The subject which Lord Charles Beresford treats is one of special importance. We have in the Navy a large number of ironclads which, though old, are perfectly sound. They were fine ships in their day, and if anything can be done to bring their offensive powers up to the modern standard without incurring an undue expenditure, we must admit that the armed strength of this country at sea would be greatly increased. Here, again, the opinion of the combatant naval officer must be of great interest and importance. I hope the author of this paper will be able to show us how we can, for a moderate expenditure, make a really effective addition to our fleet. I use the word "effective" advisedly, because, with modern navies springing up all round, I feel doubtful whether our older ironclads—deficient as they are, and must always be, in speed—can be reckoned as a trustworthy element in our scheme of national defence.

I may congratulate the Institution on having obtained a paper from Mr. Charles Parsons, on that most interesting new departure in marine propulsion—the successful introduction of the steam turbine as a substitute for the old type of reciprocating engine. I would also congratulate the members of the society on the fact that Mr. Macfarlane Gray has regained his liberty of speech, and that he has prepared two papers for the Institution this year. His voice has been silent too long at our meetings, but we may hope in the future to have the benefit of his rich stores of scientific knowledge, and I am sure that you will all rejoice with me that this is the case.

The lectures which Professor Lewes gives us from time to time are counted amongst the greatest treats which we enjoy at these meetings, and I think I can promise the members who will attend our evening meeting to-morrow that they will not be disappointed, either with his paper, or with the demonstration which will accompany it.

On Friday we have two interesting practical papers, one by Mr. Beardmore on nickel steel for boiler plates and forgings, and the other by Herr von Kodolitsch on that most interesting modern application of electricity to driving tools and other classes of machinery in engine shops and shipbuilding yards. Both these papers are eminently useful, because they show us how to build our ships and engines of better material, and at the same time how to construct them in a cheaper and more expeditious manner.

I fear that I have detained you at too great a length, but it is no easy matter to keep an address of this kind, dealing, as it must deal, with so vast a subject as the shipbuilding policy of the world, within reasonable limits; it is none the less difficult to keep it entirely free from all suspicion of the scissors and paste-pot.

To the many acts of kindness which you have already shown towards me since I became one of your distinguished body, you have added a further evidence of your goodwill in listening to me to-day with so much patience and toleration.

RECENT TRIALS OF THE CRUISERS "POWERFUL" AND "TERRIBLE."*

By A. J. DURSTON, Esq., C.B., R.N.

Engineer-in-Chief of H.M. Navy, Member of Council.

THE recent official trials of the large cruisers *Powerful* and *Terrible* have attracted attention, owing to the large departure from previous boiler practice in the British Navy made in those vessels, and the magnitude of the installation. It is proposed to give a description of the trials with data obtained therefrom.

These trials have been so fully and completely reported in the professional and other papers, that the writer now submits this paper for the purpose of eliciting those valuable criticisms which, from their long and varied experiences in charge of or in building warships and their machinery, the members of this Institution can contribute, and thus assist us, who are engaged in endeavouring to make the propelling machinery of our fleet as efficient as practicable.

Mr. Milton, in his two valuable contributions to the Transactions of this Institution in 1893 and 1894, gave a very full description of the various types of water-tube boilers then in use and building, to which members can refer for the recent history of this subject. It need only be added that the question of fitting water-tube boilers to our warships generally has been much accelerated of late years by the introduction of the small tube type of water-tube boilers by our Thames torpedo-boat builders, and by the action of Lord George Hamilton when First Lord of the Admiralty in 1891, in ordering an installation of this type for the *Speedy* torpedo gunboat of 4,500 I.H.P.

The advantages gained in weight and quickness of action in this vessel were so great that attention was turned to the installation of water-tube boilers of the large-tube type adopted by our neighbours across the Channel in both their Naval and mercantile ships. The result of further enquiries was the selection for the ships of our Navy of second-class cruiser class and above, of that type of boiler which has been most extensively adopted, and of which the greatest experience had been gained, especially in the long ocean voyages of the Messageries Maritimes mail steamers, and which was found to possess similar advantages.

Before proceeding to the description of the trials of the *Powerful* and *Terrible*, it may help to simplify the basis of discussion if the practice of the Admiralty in regard to the power and heating surfaces specified in their contracts for machinery of ships is stated. For cylindrical boilers and forced draught the conditions are :—

(1) A trial at maximum power for four hours, with air pressure not exceeding 1 in. of water in stokeholds.

(2) A trial at natural draught power for eight hours, the air pressure not to exceed $\frac{1}{2}$ in. This natural draught power is about 80 per cent. of the maximum power.

(3) A trial of 30 hours at about 50 per cent. of the maximum power, and called the continuous sea-going power.

(4) The heating surface is designed to be not less than 2·5 square feet per I.H.P. at natural draught, which is equivalent to about 4 square feet at the continuous sea-going power.

(5) Trials are made every three months of ships in commission, on which for four hours the full natural draught power is required, and, for another twenty hours, the continuous sea-going power at least, with the engine-room complement in three watches.

(6) It can be stated that in many ships, and for periods of from 48 to 96 hours, over 90 per cent. of the natural draught power, or over 75 per cent. of the maximum power, has been maintained, and as in action two watches will be on duty in the engine-room and stokeholds, it is not an extravagant assumption to make (provided the boilers are clean and engines suitably adjusted, and other conditions favourable), that the maximum power can be obtained whenever required for short periods. For long chasing, a more or less close approximation to natural draught power and speed can be maintained.

(7) One other point. It is well known that, for the great bulk of the steaming of a man-of-war, the speed required is only moderate. As speeds have increased, the proportion of maximum to ordinary cruising power has become very great. Taking 10 knots as the ordinary cruising speed, the proportion of full power required for this, which in the days of the first ironclads was 50 per cent., decreased to 33 per cent. in the *Thunderer*, and more recently to 13 per cent. in the *Aurora* class and in the *Royal Sovereign* class, 11 per cent. in the *Edgar* class, and finally, about 8½ per cent. in the cruisers *Powerful* and *Terrible*. These facts well illustrate that of necessity the machinery of a warship is a compromise between economy and those conditions involving small space and weight. Dominating all is the facility it should afford the captain in handling his ship in action or in maintaining speed in chasing.

Belleville boilers are fited in the *Powerful* and *Terrible*, and as boilers of this type were previously tried in the *Sharpshooter*, a statement of the results obtained in that vessel will form a useful preliminary. The *Sharpshooter* is fitted with eight

* Read at the Thirty-eighth Session of the Institution of Naval Architects, April 7th, 1897, The Right Hon. the Earl of Hopetoun, G.C.M.G., in the Chair.

Belleville boilers, having a heating surface of 7,700 square feet, and grate surface of 270 square feet. The amounts of heating and grate surfaces were selected independently of the maximum power of the engines originally fitted, and boilers were put in of a size suitable to space available. After the boilers were fitted on board, a series of evaporation trials were made at rates of coal consumption varying from 9·19 lbs. to 19·43 lbs. per square foot of grate, with the results shown on Table I. The two trials at about 19·4 lbs. per square foot of grate, and of seven to eight hours' duration, gave 9 lbs. of steam per lb. of Welsh coal from a temperature of feed of 50 deg. evaporated at 386 deg., or 195 lbs. pressure. The feed was measured through special tanks, and careful watching of the separators showed no water passing over from the boilers to the engines. At about the same time some similar evaporation trials were made on the cylindrical boilers of other ships, and the results, in regard to evaporation of water per lb. of fuel were slightly under those with the Belleville boiler. This point is not insisted on here further than to state that the trials showed us no disadvantage in point of economy would accrue from the use of the Belleville boiler. Mons. Risbec, the Director of the Messageries Maritimes Co., also, in a letter published some time since in the professional press, states his experience to be that little or no difference in economy exists between the Belleville and cylindrical boiler. (See *Engineering*, January 10th, 1896.)

On the *Sharpshooter's* eight hours' trial at sea, to correspond with the natural draught power of the locomotive boilers originally fitted, 2,612 I.H.P. was maintained with all the boilers in use, the coal consumption being 1·98 lbs. per I.H.P. per hour, and 19·4 lbs. per square foot of grate. This was followed by a three hours' trial at higher power, when 3,220 I.H.P. was maintained with all boilers in use, the coal consumption being 2·05 lbs. per I.H.P. per hour, and 24·5 lbs. per square foot of grate. As the outcome of a discussion in Parliament this vessel was ordered to carry out a series of trials, each extending over 1,000 nautical miles, to test the endurance of the boilers their suitability for manœuvring the ship, and the consumption of fuel at various powers. This distance, too, used up nearly all the coal conveniently accessible. To avoid risk of failure of the engines, which are of very light construction, it was decided to use only six boilers for these trials out of the eight fitted.

Eight trials were made, each of 1,000 miles, and occupying from 62 to 69 hours each, and one (the first) of 700 miles, which was thus shortened on account of fog. Four were at 1,550 I.H.P., giving about the same proportion of boiler surface to I.H.P. as is provided for the continuous steaming power (18,000 I.H.P.) of *Powerful* and *Terrible*. Two of them were at about 1,800 I.H.P., two others about 2,000 I.H.P., and the final trial at about 2,200 I.H.P., the latter giving the same proportion of boiler surface to I.H.P. as that corresponding to 25,000 I.H.P. in *Powerful* and *Terrible*. All these trials were carried out with perfect success as regards the boilers and all their fittings, and the manœuvring of the ship as affected by the boilers. The few small repairs done were of a trivial character.

From Table II. it will be seen that the consumption of coal on these nine trials averaged 1·87 lbs. per I.H.P. per hour, the lowest being on the final trial, viz., 1·73 lbs.

The many good tactical points proved to be possessed by these boilers need not be reiterated here; they are sufficiently indicated in the footnote to Table II., containing the report of the commanding officer of the *Sharpshooter*, and no doubt Admiral FitzGerald will deal more fully with these points. One may

TABLE I.

EVAPORATIVE TRIALS OF "SHARPSHOOTER" WITH FOUR BELLEVILLE BOILERS IN USE, HAVING A TOTAL GRATE SURFACE OF 135 SQUARE FEET, AND HEATING SURFACE OF 3,848 SQUARE FEET.

Duration of Trial.	Steam Pressure (by Gauge).	Temperature of Feed Water in deg. Fahr.	Coal burnt per Square Foot of Grate per Hour.	Lbs. of Water evaporated per lb. of Coal.	
				Actual.	From and at 212° Fahr.
Hours.	Lbs.		Lbs.	Lbs.	Lbs.
8	209	50	18·8	8·27	10·1
8	194	50	19·43	9·07	11·1
7	196	50	19·4	9·0	11·0
8	188	51	12·09	8·5	10·4
8	195	51	9·19	8·64	10·5
8	219	51	12·1	8·88	10·9

TABLE II.

H.M.S. "SHARPSHOOTER" SPECIAL SEA TRIALS.

No. of Trial.	Date.	Distance Run.	Duration of Trial.	Nature of Trial.	Indicated Horse-power.	Speed by Log.	Number of Boilers in use. (Total number 8).	Grate Surface in use.	Total Heating Surface in use.	COAL.		
										Total during Trial.	Per sq. ft. of Grate per Hour.	Per I.H.P. per Hour.
	1895.	Miles.	Hours.					Sq. ft.	Sq. ft.	Tons.	Lbs.	Lbs.
1	June 20 to 22 ...	693	48½	Sea	1,553	14·3	6	202	5,770	63	14·4	1·87
2	June 25 to 28 ...	1,000	69	Sea	1,549	14·4	6	202	5,770	91·4	14·6	1·91
3	July 3 to 6	1,000	66½	Sea	1,569	15·0	6	202	5,770	96·5	16·0	2·07
4	July 11 to 14 ...	1 000	68	Sea	1,554	14·7	6	202	5,770	91·8	14·9	1·94
-	July 19 to 23 ...	Trial abandoned on account of bad weather.										
5	July 28 to 31 ...	1,000	66½	Sea	1,804	14·9	6	202	5,770	103·4	17·2	1·92
6	August 7 to 11 ...	1,000	69½	Sea	1,820	14·4	6	202	5,770	104·2	16·6	1·84
7	Sept. 18 to 21 ...	1,000	65	Sea	2,016	15·3	6	202	5,770	105·1	17·9	1·8
8	Sept. 28 to Oct. 1	1,000	63½	Sea	2,037	15·7	6	202	5,770	103·2	18·0	1·79
9	Oct. 8 to 13	1,000	62	Sea	2,194	16·1	6	202	5,770	105·4	18·8	1·73

perhaps be mentioned: the quickness of action of these boilers, as in those of the small-tube type, is due to the small quantity of water they contain, the system of feeding employed enabling the boilers to be worked with perfect safety, and to readily respond to the demands made on them.

The *Powerful* and *Terrible* are designed to attain a maximum power of 25,000 I.H.P. for short periods, and a continuous sea-going power of 18,000 I.H.P. for as long as the coal lasts. To insure that these conditions would be fulfilled, the trials specified were as follows:—

(1) An eight hours' trial, during the first four hours developing not less than 25,000 I.H.P., and during the second four hours not less than 22,000 I.H.P.

(2) A 30 hours' trial, maintaining not less than 18,000 I.H.P.

To add to our information as to the probable consumption of coal at lower speeds, as when cruising with a fleet, a third trial was specified, viz.:—

(3) A 30 hours' trial, during which a power of 5,000 I.H.P., or 20 per cent. of the full power, was to be maintained. On the two last-named trials the coal consumption was to be carefully measured, and the evaporators were required to maintain the water level in the boilers and feed tanks, and thus make up all waste, so that the coal measured would include distilling, electric light, and all other auxiliary services of the ship that are necessary when steaming for prolonged periods.

The engine pressure specified was 210 lbs. per square inch, an increase of 60 lbs. beyond that of the vessels immediately preceding them. This increase was made to take advantage of the special feature of the boiler—viz., its adaptability to the use of high steam pressures, and thus to reduce the size of the engine required for the maximum power, and to secure economy. Two low-pressure cylinders were fitted, the engine being of the four-cylinder triple-expansion type, with dimensions as follows:—H.P. cylinder, 45 in. diameter; I.P. cylinder, 70 in. diameter; two L.P. cylinders, each of 76 in. diameter, with stroke of 4 ft. and a designed cut-off in the H.P. cylinder of 74·5 per cent. The extreme ratio of cylinders is 5·7 : 1. Allowing for clearances in H.P. cylinders of 25 and 31 per cent. in the *Powerful* and *Terrible* respectively, the real ratios of expansion at the full powers were about 6·62 and 6·08.

The cylinders are arranged in both ships with the high-pressures forward and the two low-pressures aft, but the cranks of the engines are somewhat differently disposed with regard to each other. In the *Powerful* the two low-pressure cranks are opposite one another, and the high-pressure and intermediate-pressure are also opposite each other, but at right angles to the low-preesure cranks. In the *Terrible* the four cranks are placed consecutively at right angles with each other. The coupling bolts of the shafts are arranged in both ships to admit of variation in the disposition of the cranks. As regards vibration of ship, of which there was but little, and that only at from 90 to 95 revolutions, the trials showed that the *Powerful's* was the more desirable arrangement.

As regards the engines, several trials were made to overcome

TABLE III.

MEAN RESULTS OF THE TRIALS OF H.M.S. "POWERFUL" AND "TERRIBLE," AND TWO VESSELS WITH CYLINDRICAL BOILERS

Name of Ship.	Description of Trial.	Proportion of Full Designed Power Developed.	No. of boilers in use on the Trial.	Grate Area in Use.	Heating Surface in Use	Steam Pressure (by Gauge).		Fall of Pressure from H.P. Receiver to Steam Line of H.P. Diagrams		Jacket Pressures (by Gauge).			Receiver Pressures (by Gauge).		
						Boilers.	Engines.	At commencement of Stroke	At Middle of Steam Admission Line.	H.P.	I.P.	L.P.	H.P.	I.P.	L.P.
				sq. ft.	sq. ft.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Powerful	30 hours' coal consumption ...	·201	16	733	22,600	225	180	0	25	82	35	12·7	132	26	—(2·3)
Do.	30 hours' coal consumption ...	·738	48	2,200	67,800	232	186	8	35	127	42	11·6	194	51	10·2
	Unsuccessful full power	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Do.	Full power — First 4 hours	1·03	48	2,200	67,800	257	207	4	34	177	53	12·2	205	69	15
	Full power — Second 4 hours	·909	48	2,200	67,800	237	187	2	32	167	47	12·9	192	64	13·8
Terrible	30 hours' coal consumption ...	·203	16 to 20	733 to 916	22,600 to 28,250	208	162	13	28	82	34	9·5	140	32	1·8
Do.	30 hours' coal consumption ...	·74	48	2,200	67,800	223	199	33	53	134	46	10·6	192	53	12·8
Do.	Full power — First 4 hours	1·026	48	2,200	67,800	229	197	18	42	159	50	11·7	195	70	22·5
	Full power — Second 4 hours	·895	48	2,200	67,800	225	196	28	52	150	46	11·4	190	62	18
Recent representative battleship ...	30 hours' coal consumption ..	·518	8	820	25,045	139	136	18	40	133	40	10·1	136	37	3·6
Do.	8 hours' natural draught ...	·872	8	820	25,045	150	148	5	20	133	17	7·7	148	56	11·1
Do.	4 hours' full power	·023	8	820	25,045	152	147	6	23	146	49	13·1	147	59	13·6
Recent representative 2nd-class cruiser	30 hours' coal consumption ...	·513	8	626	18,700	145	142	3	21	Not used.	38	8·5	141	46	6·5
Do.	8 hours' natural draught ...	·855	8	626	18,700	149	149	4	18	Not used.	56	13·5	146	55	10
Do.	4 hours' full power	1·025	8	626	18,700	151	147	7	14	Not used.	65	16·5	146	53	12

(*a*) At 68·41 revolutions. (*b*) At 102·73 revolutions. (*c*) At 63·71 revolutions. There was a strong wind on the

difficulties of detail; after the necessary adjustments were completed everything worked very satisfactorily.

All the cylinders are steam jacketed, the jacket reducing valves in each ship being loaded to 100 lbs. in the case of the intermediate cylinders and 25 lbs. for the low-pressure cylinders. The high-pressure cylinders are jacketed with steam of 210 lbs., *i.e.*, with steam taken from the engine side of the main reducing valve.

Coming now to the boilers, these are 48 in number, alternately of seven and eight elements each. One-third of the boilers are arranged with tubes athwartship at the forward end of the vessel in four watertight compartments, while the remaining two-thirds are placed with tubes fore and aft in four other watertight compartments between the former and the engine-rooms. As regards the leads of feed and steam pipes, the boilers are divided into six distinct groups, with a separate steam and feed service to each group. The six main steam pipes are carried aft to the forward bulkhead of the engine-room, three on each side of the middle line of the ship, with a stop valve on each at this bulkhead.

The total heating surface of the boilers is 67,800 square feet, and the grate surface 2,200 square feet; the boiler pressure is 260 lbs. per square inch, reducing valves being fitted in the engine rooms to limit the engine pressure to 210 lbs. per square inch. The six main feed pumps are placed in the engine-rooms. There are eight auxiliary feed pumps, one in each boiler-room. In addition to the stokehold fans, necessary to ensure a constant supply of air from the upper deck in all circumstances of weather, air-blowing engines for the purpose of supplying air in jets to mix the furnace gases and assist the combustion are fitted.

Experience with these boilers had previously shown that, to secure efficient results the fires should be stoked at regular intervals, and kept light in view of the fact that practically only the funnel draught was available. For this purpose clocks were fixed in the stokeholds and the two furnace doors in each boiler were fired alternately at intervals of about four or five minutes, thus the fire was replenished every eight or ten minutes. Sight holes are provided in the smoke-box casings through which the fires can be observed. Air gauges can be inserted in these sight holes to ascertain the pressure of the gases over the fires. The amount of coal burnt at the trials of 18,000 I.H.P. and under was ascertained by tallying and weighing one bucket in three.

A tabulated list of the particulars of the trials of the two ships is given in Table III.

The first trial to be made was that of the *Terrible* at 5,000 I.H.P., or 20 per cent. of full power. On this trial the coal consumption was higher than anticipated, due in a large measure to irregular stoking, and to some internal defects of the engines which were subsequently removed. The trial of the *Powerful*, which took place shortly afterwards, gave much better results as far as the consumption of coal was concerned, the stoking in this case being done in the regular manner above described. The consumption per I.H.P. per hour was 2·06 lbs., and this compares

TABLE III.—*Continued.*

Mean Effective Pressures in the Cylinders.				Mean Cut Off in the H.P. Cylinder.	Vacuum in Condensers.	Revolutions of Main Engines per Minute.	I.H.P. (Total).	Mean Effective Pressure referred to the L.P. Cylinder.	Absolute Pressure at Release in the L.P. Cylinder	Total Ratio of Expansion on Trial.	Coal used per hour.		Propellers.				Speed on Measured Mile or Deep Sea Course.
H.P.	I.P.	L.P.									Per sq. ft. of Grate.	Per I.H.P.	Diameter.	Pitch.	Slip Per Cent.	Expanded Blade Area of Each.	
		Forward.	Aft.														
lbs.	lbs.	lbs.	lbs.		ins. of merc'ry			lbs.	lbs.		lbs.	lbs.	ft. ins.	ft. ins.		sq. ft.	knots.
36·85	11·53	5·89	5·47	·42	26·9	67·26	5,044	17·0	6·0	9·77	14·2	2·06	19 6	23 8½	10·3	78	14·347 (*a*)
85·65	27·56	14·15	14·04	·595	26·6	102·84	18,459	40·8	12·6	7·74	15·4	1·835	„	„	12·8	„	20·957 (*b*
...	...	...	...	...	...	112·39	24,796	...	...	...	...	...			16·2		22 035
95·27	40·48	17·54	17·6	·74	26·0	114·46	25,900	51·4	17·7	6·62	Not taken	...	„	„	18·5	„	21·8
89·76	36·22	16·09	16·11	·69	26·1	109·62	22,725	47·1	15·7	6·96	Not taken	...		„	...	„	Not taken
30·68	14·11	6·37	6·66	·278	26·8	64·42	5,073	17·9	6·3	10·86	18·1 to 14·5	2·6	„	24 0	11·0	92	13·434 (*c*)
74·17	28·92	15·49	15·39	·602	26·2	102·7	18,500	40·9	15·0	7·0	14·4	1·71	„	„	14·4	,	20·964 (*d*)
86·73	35·81	21·07	21·79	·738	25·9	112	25,648	52·1	18·9	6·09	Not taken	...	„	„	15·7	„	22·41 (*e*)
80·21	32·17	18·4	19·13	·69	26·0	108·89	22,370	46·7	17·0	6·39	Not taken	...	„	„	...	„	Not taken
32·43	19·00	8·68		·555	27·7	82·91	6,216	23·8	8	...	13·8	1.82					
48·24	25·07	13·13		·638	25·6	97·16	10,465	34·3	11·7	...	29·5	2·3					
54·14	28·04	14·69		·707	26·4	101·8	12,280	38·4	14·0	...	Not taken	...					
38·35	18·55	8·9		·39	26·6	117·85	4,925	24·7	7·9	...	12·6	1·6					
54·0	28·55	12·3		·63	28·1	136·15	8,208	35·6	11·2	...	28·8	2·2					
66·55	30·45	13·5		·75 to ·69	27·9	144·95	9,840	40·1	14·0	...	Not taken	...					

bow during this trial. (*d*) At 103·45 revolutions. (*e*) At 112·26 revolutions.

favourably with older engines at the same percentage of their full power. It must be remembered that on these trials the engines were working at only 20 per cent. of full power, and that the coal consumption includes that for electric lighting of vessel, making up waste of feed water, and all other auxiliary services, which account for a considerable proportion of the total coal expended when the main engines are exerting low powers.

The trials at 18,000 I.H.P. were made to test the working and coal consumption at the continuous sea-going power. This specified power is 72 per cent. of the maximum. The cut-off in the high-pressure cylinders was practically ·6 in both ships. From Table III. it will be seen that about 18,500 I.H.P. was realised in each vessel, the coal consumption, including all auxiliary work, being 1·83 lbs. in *Powerful* and 1·71 lbs. in *Terrible*, the proportion of the realised power to the designed full power being 74 per cent. Taking into account the effect of clearance, the ratios of expansion of the steam on these trials are 7·73 and 7·0 in the *Powerful* and *Terrible* respectively. The final pressures of the steam in the two cases were 12·6 and 15 lbs. absolute respectively. A less consumption of coal per I.H.P. per hour may reasonably be expected at lower powers—say, at 50 per cent. of the maximum with the engines further linked up. The coal consumption compares favourably with that of older vessels in the Service at the same percentage of the maximum power of the engines.

Two examples, which are averages of their respective types, may be taken. In recent battleships with 150 lbs. steam pressure at the engines, the mean coal consumption at an average of 86·5 per cent. of the maximum power in four vessels was 2·25 lbs. on trials of eight hours' duration, and at 51·3 per cent. the mean results from seven vessels gave 1·73 lbs. per I.H.P. per hour on trials of 30 hours' duration. In recent second-class cruisers, also with 150 lbs. steam pressure at the engines, the mean coal consumption in six vessels at an average of 85·8 per cent. of maximum power was 2·18 lbs. on eight hours' trials; and in nine vessels at 51·1 per cent. of maximum power it was 1·64 lbs. per I.H.P. per hour on thirty hours' trials. In view of these figures, the coal consumption at 74 per cent. of maximum power—viz., 1·83 lbs. and 1·71 lbs. in the *Powerful* and *Terrible* respectively—is satisfactory.

On the full power trials the 25,000 I.H.P. specified was exceeded by 900 in the *Powerful* and 648 in the *Terrible*. The speed of 21·8 knots is recorded on the full power trial of 25,900 in the *Powerful*, but as the weather conditions were not favourable, it is considered the true speed in smooth water would have borne the same proportion to revolutions per minute as that obtained on the previous trials of October 21st, 1896, when from an I.H.P. of 24,796, and 112·39 revolutions, a speed of 22·03 knots was obtained as the average of three runs over the same 23-knot course. The speed trials at 5,000 I.H.P. were made over the measured mile in Stokes Bay; but those at 18,000 I.H.P. and 25,000 I.H.P. were made over the 23-knot course between Rame Head and Dodman Point.

It will be seen from Table III. that the screw propellers of the two ships differed considerably in blade area, but the conditions of weather on the high power trials precluded an absolute comparison being made of their efficiency. It is intended at an early date to make further trials on the measured mile to determine this and other questions. The jacket pressures recorded are lower than were intended to have been used, but it was thought by the contractors advisable to use these fittings with caution and this course was agreed to.

On comparing the diagrams of the two sets of trials, average specimens of which are given, it will be seen that the mean fall of pressure on the full power trials from the high pressure receiver to the cylinder at the commencement of the stroke is about 4 lbs. in the *Powerful*, and about 18 lbs. in the *Terrible*. If we take the fall of pressure to the middle of the admission lines of the diagrams, the reductions of pressure are about 34 lbs. and 42 lbs. respectively. This divergence occurs, although the areas for the admission and passage of steam through the cylinder ports are larger in the *Terrible* than in the *Powerful*.

This difference is still more marked on the trial at 18,000 I.H.P. The fall of pressure from receiver from H.P. cylinder at the commencement of the stroke is about 8 lbs. in the *Powerful* and about 33 lbs. in the *Terrible*, and taking the fall of pressure to the middle of the admission lines of the diagrams as before, it is about 35 lbs. and 53 lbs. in the two ships respectively.

It is considered that the comparatively large loss of pressure in the *Terrible* is due principally to the small amount of lead given to the valve, and to the larger clearance spaces in the H.P. cylinder. This will be further investigated when the ship is employed on regular service. In full gear the ratio of lead to maximum opening is ·36 in the *Powerful* and ·14 in the *Terrible*.

One other comparison, which may be of interest, is given in a tabular form as follows:—

Comparative Weights per I.H.P. with Recent Designs.

Ship.	Indicated Horse-power.	A. Weight of Machinery in Eng. Rms.	I.H.P. per Ton of A.	B. Weight of Propellers, &c.	I.H.P. per Ton of B.	C. Weight of Boilers and Fittings.	I.H.P. per Ton of C.	D Total Weight of Main Machinery and Boilers = A+B+C.	I.H.P. per Ton of D.
		Tons.		Tons.		Tons.		Tons.	
Average of three recent battleships	10,000 (N.D.)	445·4	22·43	96·6	103·6	726·51	13·76	1268·51	7·9
	12,000 (F.D.)		26·93		124·36		16·52		9·46
Powerful	25,000	789·5	31·66	192·72	129·7	1162·05	21·51	2144·27	11·7
Percentage of increase ...	Compared with N.D.						56		
	Compared with F.D.		17·56		4·3		30·2		

The weight of machinery of the *Powerful* at 25,000 I.H.P. as compared with those of three recent battleships at 10,000 I.H.P., their natural draught power, shows the increase of I.H.P. per ton weight of boilers to be 56 per cent. The weights of auxiliary machinery, such as steering, capstan, electric light, distilling, &c., not directly connected with the main propelling machinery, are not included.

On referring to Table III. it will be seen that a large area of fire-grate to I.H.P. is obtained with this large tube type of water-tube boiler, a factor of considerable advantage in the maintenance of power for long periods. The Belleville system of automatic feeding has been described elsewhere, and it need only be stated here that it answered perfectly on these trials.

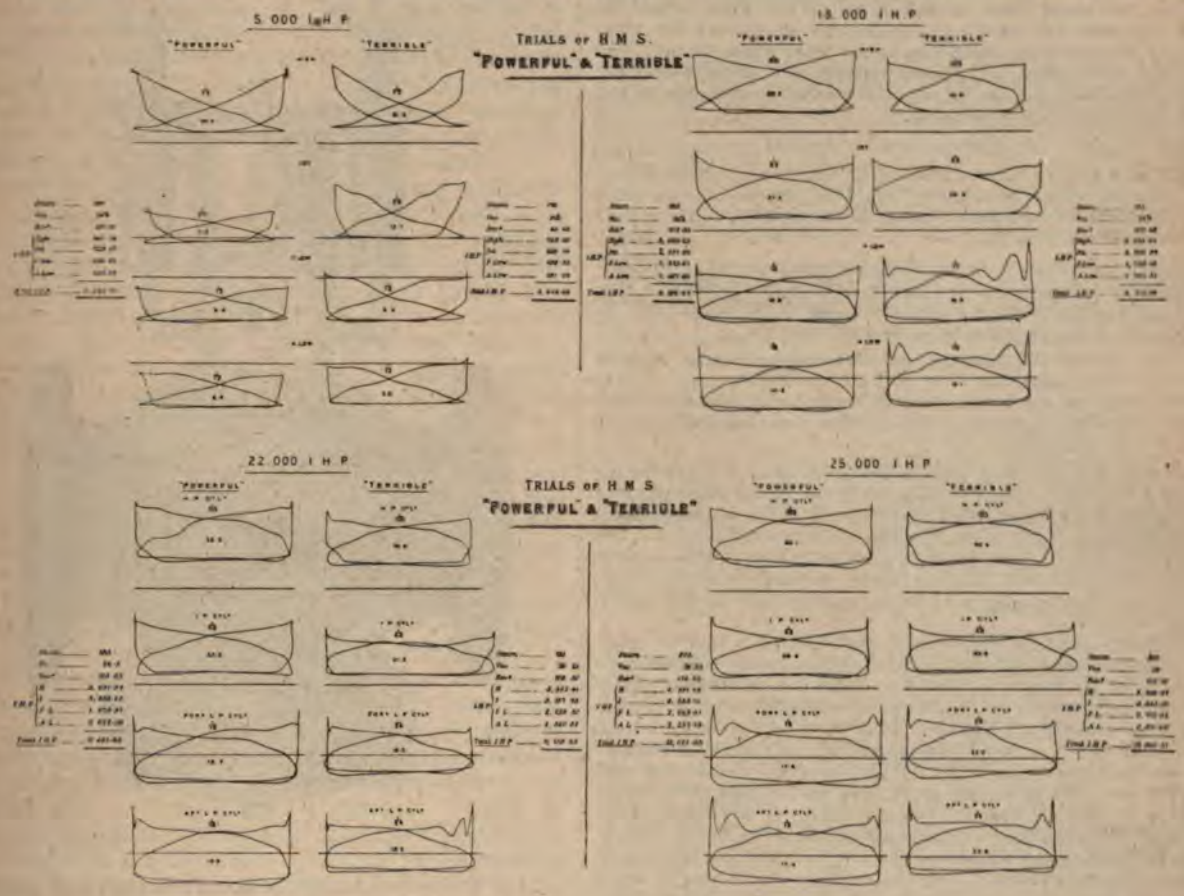
Throughout the trials the behaviour of the boilers was entirely satisfactory, and they fully realized the expectations of the Admiralty. Practically, no defects were developed in the boilers. A few lead plugs were blown out in one vessel, which was accounted for by their being too loosely fitted, and when refitted they gave no trouble. A small copper pipe connecting the feed regulator with the lower part of the element of one boiler gave way, and had to be renewed. Beyond this there was no trouble of any kind with the boilers. When working at the highest powers the decks and casings in the vicinity of the uptakes were heated to an undesirable extent, but when lagging was fitted, as had been originally provided for in the specification, there was no further trouble from this cause.

Reference is made in the early part of this paper to the success which has attended the installation of the small tube type of water-tube boiler in the *Speedy*, and which is now being

fitted in all the vessels of the third-class cruiser or *Pelorus* type, and also the torpedo flotilla. These vessels are all required to realize a high power and speed for comparatively short periods, and to work in connection with a squadron, or from a conveniently near base, where stores may be obtained and defects made good. On the other hand, in the larger classes of vessels, which may have to serve continuously on distant stations for one, two, or three commissions, without extensive repairs to the boilers, and for considerable periods to rely on their own staff to keep the machinery and boilers in efficient condition, the large-tube type of water-tube boiler is regarded as the most suitable successor to the cylindrical boiler, which has been employed under these conditions. In the present state of our knowledge as to the best means to preserve water-tube boilers from decay, it may be said that the endurance of such boilers is directly dependent on the thickness of the latter. It may be pointed out that the weight of water in the 48 boilers, of 25,000 I.H.P., of *Terrible* is 50 tons. In a battleship of 12,000 I.H.P. with forced draught, or 10,000 I.H.P. with natural draught, with eight cylindrical boilers and 155 lbs. pressure, the weight exceeds 160 tons.

Objections have been raised to the greater number of boilers involving a greater number of parts and complications therefrom, but against this is to be stated that the various pipes and valves are smaller, and therefore more easily managed and kept tight, and the greater number afford a better means of adjusting the power of boilers in use for auxiliary purposes or banking fires to keep engines warm; and, in case of damage in one boiler, the fraction of the whole disabled is smaller in proportion.

Although the Belleville has been adopted for the recent new ships of Her Majesty's Navy, the Admiralty are not committed to this or any type of large-tube boiler for battleships and large



tubes and the facilities afforded in the design for examination and cleaning. The large tube boiler, with its initially thicker tubes, can submit to a greater amount of wastage without so materially impairing its efficiency or its life.

A great advantage is secured in the large-tube type boilers, such as those of the *Powerful* and *Terrible*, by the interior of the tubes being so much more conveniently and quickly examined, and their condition ascertained, than in the small-tube type. The whole of the work of cleaning the insides and outsides of the tubes can be done from the stokehold floor. These advantages are possessed in varying degrees by other designs of the large-tube type.

In selecting, therefore, water-tube boilers of the large-tube type for ships of, and above, the size of second-class cruisers, advantage was anticipated in point of endurance comparable to that of the cylindrical boiler, whilst effecting a considerable reduction of weight, due to the small quantity of water carried in the former and the avoidance of the thick plating of the cruisers. In fact, at the present time there is being fitted in the torpedo gunboat *Seagull* a set of boilers of the Niclausse design, for the purpose of obtaining information as to its suitability. There is also on order a set of water-tube boilers of the Babcock & Wilcox design, for the torpedo gunboat *Sheldrake*. These latter have tubes of $1\frac{15}{16}$ in. diameter, being intermediate in this respect between the large tube and small tube types. A similar course has been followed in regard to the small-tube types of boiler, to determine which are suitable for naval purposes.

Reverting to the *Powerful* and *Terrible*, it is submitted that in those vessels we have boilers which will compare favourably with the old type of cylindrical boilers as regards consumption, endurance, and facilities for examination; and that in all other respects for their particular application to the purposes of a warship they are superior.

Finally, the success of these trials is largely due to the enterprise of the builders of the vessels, who threw themselves

heartily into a new system of boiler construction, and I feel certain this Institution will fully appreciate what they have accomplished, and rejoice in their success.

To the above I would beg to add my sense of great indebtedness for the loyal manner in which my brother officers of the Admiralty and afloat, not forgetting the artificers and stokers, have aided in carrying this work to a successful issue. To the complete arrangements for the management of these ships on their trials, made by Captain Fawkes and the Reserve and Dockyard officers, everyone who was present will bear willing testimony.

ABSTRACT OF MANŒUVRING TRIALS (details attached)

Ship manœuvred as in action, machinery suddenly stopped (frequently from full speed), starting again without warning after intervals of from five minutes to 1½ hours, getting away at full speed from banked fires. Fires were banked on December 9th at 7 p.m., and steam maintained all night at 150 to 200 lbs., till 8 a.m. on the 10th, when the ship was got under way, and started immediately at full speed and manœuvred for six hours. There was no priming at the engines during these trials.

COPY of a LETTER from Commanding Officer of H.M.S. *Sharpshooter*, dated December 12th, 1895, enclosed in a letter from the Commander-in-Chief, of Portsmouth, to the Secretary of the Admiralty:—

I HAVE the honour to report that, in compliance with Admiralty letter (S. 14,436) of the 9th October, 1895, I carried out in Her Majesty's Ship under my command the trials mentioned in paragraph 2 of that letter on three occasions, viz.:—

(*a*) At Portland on 2nd December whilst at torpedo practice.
(*b*) Off the Nab on the 10th December at target practice.
(*c*) At Spithead on the 11th December at torpedo practice.

In all cases the ship was manœuvred as she might be in battle, the vessel cleared for action, and the men at their stations for general quarters. Full power for four boilers was used, giving a speed of 13½ knots, 190 revolutions, and 1,450 I.H.P.

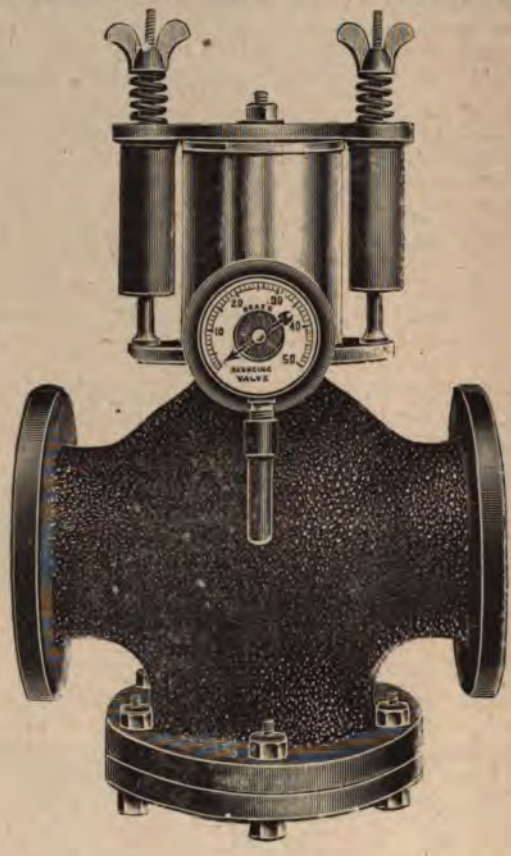
The following manœuvres were practised: Stopping frequently from full speed and starting again, without warning, after intervals of five minutes to 1½ hours, getting away at full speed from banked fires.

All that was found necessary in the stokeholds was to close the draught plates of the furnaces, and open wide the tube box-doors, and in the engine-rooms to make a moderate use of the blow-off valves to the condensers when suddenly stopping. There was no priming at the engines. Fires were banked on the 9th of December at 7 p.m., steam maintained all night at 150 to 200 lbs. till 8 a.m. on the 10th, when the ship was got under way and started immediately at full speed, and manœuvred, as already mentioned, for six hours. On this trial, as a precautionary measure, a petty officer was stationed at the separator to ensure that its blowing-out apparatus did not fail, but the apparatus acted most satisfactorily, and the services of the petty officer were not once required. During the above trials the stokers employed were the men forming the first training class, who had been in the ship about a fortnight.

I have, &c.,
(Signed) A. DODGSON,
Lieutenant Commander.

REDUCING VALVE.

APART from the general uses to which this class of valve has always been put, additional interest has been lent to it recently from the reason that it is an essential part of the equipment of water-tube boilers. The pressure of steam generated being too high for consumption in the engines, these valves are fitted to bring the two into unison. To use them, however, it has been requisite to work the valves generally by hand, and, therefore, if the pressure varies, as it may well do in the case of the boiler, constant manipulation is necessary to check that feeding the engines. This is of course, a tedious operation, and no doubt with a view to avoid this trouble, the Messrs. Boaz, of West India Dock Road, E, have patented the system we illustrate. We can only present an external view of the same, but a very good general idea of the action may be obtained therefrom. The higher pressure enters on the right hand side and meets with the valves in the centre of the box. These are set on a vertical stem, the top of which is shown between the two spiral



springs controlled by fly nuts. These springs, acting conjointly, have the effect of a cushion on the cross-head connecting them, the valve stem and an expansion chamber, which is shown encased above the valve box. This expansion chamber is after the style of a concertina, and consists of a series of metal boxes attached to the valve stem. By screwing down the fly-nuts the valves are forced from their seats below the diaphragm, and the steam thereby obtains admission above the valves, and finding its way into the larger space, becomes expanded and reduced accordingly. This process goes on against the action of the springs and tends to close the valves, thereby diminishing the aperture until a position of equilibrium is attained. The outlet is of course through the box to the left hand in the illustration, and if there should be no further use for the reduced pressure the valves close and shut off the supply of steam of their own accord. The action is automatic when

once the springs are set properly. The interior small valve is directly attached to the valve stem, but the larger one surrounding it acts loosely and with a certain clearance. The action therefore is very sensitive, and this is necessary, for with the ordinary reducing valve worked by hand force may be used to overcome friction; but in this case the springs being tight might not operate successfully to lower a large valve from its seat, so the precaution is taken to first open the small valve only, and this assists the other without any risk of sticking. The result is therefore very accurate always, we are informed, and only a 3¼ in. opening is necessary to get the apparatus started. The connection of the stem to the valves is by ball and socket joint, so that if one spring is more screwed down than the other all side grip is prevented, and the valves are enabled always to take their proper seatings fairly. In order that the valves may not have more than the full opening required there is at the bottom of the apparatus a cap nut, which arrests any further movement downwards.

Generally, therefore, the system is a very ingenious one, because, without requiring any attention, it is practically certain in action. When the high pressure is turned on into the valve box and has passed through the valves, these remain open until the reduced pressure is attained for which the springs are set, then the extension of the expansion chamber partially shuts the valves to the high pressure only, letting the required amount pass through. Put in another way, the admitted steam is wire-drawn down by the size of opening the valves give to whatever pressure the springs are set for. When, on the other hand, the reduced pressure is becoming used up the expansion chamber collapses, and this being connected to the valve stem allows the high pressure to escape through the valves and raise the reduced pressure to its required height again. With ordinary reducing valves it has been customary to have always a stop valve for shutting off the pressure, but here this is quite done away with for the reasons stated. Another form of the valve is one in which the reducing and stop valve systems are combined. In this case the adjustable valve spindle is at the bottom of the apparatus with a hand-wheel working within a stuffing-box, so that all escape of pressure is prevented. It will be acknowledged that considerable merit is displayed by the invention, and there is a likelihood of its earning for itself some name amongst engineers.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Isle of Man Traffic.

So the projected opposition to the old Isle of Man Steam Packet Co. has fallen through after all the tall talk. One cannot say that one is surprised at the fact. Messrs. D. and C. MacIver are not a firm—whatever may be their standing and connection in the over-sea trades—who have had much experience in the local traffic to the Isle of Man. The old City of Dublin boats, though, no doubt, fine vessels for their day and generation, were not built for a hard competitive service. They were constructed with a view to a heavy subsidy. They were built regardless of cost and for running regardless of cost. Their coal bills would have brought the new "syndicate" sooner to its bearings than the cutting of rates, which their employment on the Douglas route would have implied. Messrs. D. and C. MacIver circulated a statement, which appeared in the *Shipping Gazette* on the 1st April, to the effect that the chairman of the Isle of Man Co. had paid a sum of money to obtain an undertaking that the vessels should not be employed in the service. As it comes on such authority we are bound to accept it. But it is not nice reading, and it may seem to old-fashioned people strange that Messrs. MacIver, of all men, should desire the fact to attain publicity. There it is. The directors of the Isle of Man Steam Packet Co. have saved their shareholders from disastrous competition for a season, that of 1897; but they have established a precedent that may be used against them in future, and time may show that they would have been wiser to fight when the enemy against them opposed old boats to new, and brought extravagant engines to compete with those of to-day. Specially advantageously placed were they in the competition when they had rivals who knew little of the management of the class of business which they have spent their lives in conducting with success.

A Breakdown.

The experience of the new North German Lloyd steamer *Konigin Louise* is much the same as that of the fast Cramp-built boats of the American Line. The new German-built boat, like the American ships, has found that the strains on the steering gear of these huge vessels are greater than the designers have reckoned for. The *Konigin Louise* had got 600 miles to the west of Scilly, on her way from Bremen to New York, when the quadrant of her rudder broke and her steering gear became quite disabled. She accordingly put back and went into Falmouth for repairs.

Speaking of this vessel reminds one of an extraordinary story about Herr Voss, of Hamburg, a partner in the great shipbuilding firm of Blohm & Voss. He should be a practical man and know something of ship construction and management. Yet he is reported to have an idea of crossing the Atlantic with a steamer, not on the back of a bird, or in a balloon, at the rate of 190 miles an hour. The passage would be complete from Southampton to New York in sixteen hours. This wonderful speed is to be attained by the use of ten screws, placed five on each side of the vessel at equal intervals. By these means he is said to believe that he would get over the difficulty of skin friction. Such details as the displacements, draught, dimensions and H.P. of the 190 knotter are not revealed to an expectant world. But it would be interesting to know what the coal expenditure of the ship is to be and how the vessel will carry even her sixteen hours supply.

The difficulty of coal supply is one which apparently does not enter into the calculations of the good people who make visionary schemes for rapid transport of highly-paying matter, such as passengers and mails. Another practical man, who has commanded mail steamers and is now concerned in their management, suggests that the Steamship Companies should no longer be entrusted with the carriage of Her Majesty's mails. He says, and says truly enough, that they make very little out of their conveyance, except barren honour. He would have the mails, (without passengers or cargo, of course) carried by the fleet torpedo-destroyers of the Royal Navy. Thus, he thinks the most rapid transit could be secured for the mails and at the same time the officers of Queen's ships would attain valuable experience in running their craft in all weathers at express speed. This suggestion is a curious reversion to an old practice. The Admiralty used, at the beginning of the century, to convey Her Majesty's mails, and for the purpose, used ten-gun brigs, which obtained for themselves so unenviable a reputation. But the system was found to be impossible when steam came into use, though traces of the Admiralty's connection with the matter long continued in the practice of sending a Queen's officer as mail master by the mail steamer. But how are we to revert to the practice now? The fastest destroyers we have carry eighty tons of coal in their bunkers and would burn something like a hundred tons a day at full speed. Their full speed radius of action is therefore at most about six hundred miles. This would not be much use on the Atlantic. Even on the Indian route most of the stages are from fifteen hundred miles each upwards, and if at each port a fresh destroyer were waiting to take on the despatches, like post-horses on the roads in the old days, the thing would be impracticable. Besides, we must not forget that nowadays mails are bulky and weighty. The mail of 1897 is not like the pony express matter which was sent across the prairies in the pre-Union Pacific Railroad days, nor is it like the

stuff which was sent out of Paris during the siege by balloon. The modern customers of the Post Office not only want speed and regular transit, but they want to have weighty documents and newspapers conveyed, and all this at very moderate prices. We cannot do without the mail steamer yet.

The Old Holyhead Boats

will soon only be names. The Isle of Man scheme having fallen through, as I have already indicated, two of the three steamers intended to work it were disposed of to Belfast shipbreakers in the second week of April. The *Connaught* is still the property of the City of Dublin Steam Packet Co., but they are offering her for sale. All the sisters had been re-boilered of comparatively late years, but the *Connaught* is the more likely to suit a purchaser who wishes to get a little work out of her before she goes to the scrap heap. For she has cylindrical boilers, and is thus less of a fire-eater than the others. This is a very great consideration when the idea of working such a vessel without a subsidy comes to be considered.

A Steamship Company's Report.

The Leyland Line has done well in the year 1896 with its big fleet. It has now well over 100,000 tons of its own, and, besides this figure, has one-third of the interest in the Wilson-Furness-Leyland line, which owns about a third as much as this parent. But the affairs of this company, like the African, are complicated by mixed ownership. Thus, take the steamer *Megantic*. She is owned as to one-fourth by the Leyland line, and as to another by its offspring and the other shares are owned by others again. Then certain vessels that are run on the new line are owned by the old. This is good business, for it consolidates interests, and nowadays, as ever, union is strength. But it makes it very difficult for an outsider to fairly dissect the accounts and find what really exists to represent the capital of the company.

Publications.

From the agents of the Dominion Line I have received a very well illustrated pamphlet, giving a number of excellent pictures of their new crack, the *Canada*. These comprise deck views and interiors, and shew her to be what she is—a large, comfortable and well appointed liner of the first-class, and of the most modern type. Views are also given of some of the other vessels which carry on the service. Particulars of times of sailing are also afforded. The whole is very well worth acquiring and preserving. But I should like to make one or two suggestions for the next issue of this little volume, which is sure to be greatly in demand. In the first place I would have something said about the liner and her accommodation, and her size and speed. Photography is a great art, and, especially in shipping matters, it is an art which has been carried to great perfection in the way of deception. People used to say the "sun cannot lie." That is true enough. But he can be made to tell the truth in such a way as to give very false impressions, and the photographers' art in some cases is to make him do so. Homely people—as the Americans call them—are beautified, and small ships and small rooms are made to look large. The owners of the *Canada* can well allow every detail of their new ship to be tested by statistics. She is the finest and fastest boat in the trade, and that by some considerable margin. The other suggestion I would make would be that a few views of the lovely and attractive scenery of the St. Lawrence should be incorporated in the book. That would greatly tend to popularise their service with passengers, and might, in conjunction with the facilities they can offer for comfort, well draw passengers from the New York route.

I may add that an order has been placed by the owners of the *Canada* for a duplicate of her. This shows that they are satisfied with their new acquisition. I have not yet heard what the new steamer is to be called, but she is, of course, to come from the Queen's Island yard, where the *Canada* was constructed.

This discussion brings me to

The Fast Canadian Service.

This, it has been stated in Parliament, has reached the stage of a provisional agreement which has been entered into with Messrs. Peterson, Tate & Co., of Newcastle. The amount of annual subsidy which they are to receive for a weekly service of steamers of 20-knot speed is said to be £150,000, payable as to one-third by the Imperial, and two-thirds by the Dominion Government. This subsidy, it will be noted, is in amount pretty much the same as that which the American Line receives from the United States Government. The American Line, indeed, gets certain additional emoluments. But we are not told that the new line's £150,000 will include the vessel's pay as auxiliary cruisers on the Admiralty list. So that presumably the two lines will be in a very similar position as regards State aid. The terminal ports of the new line are not yet published.

But Mr. Sandford Fleming, whose previous contribution to the *Queen's Quarterly* I noticed when it came out, has again been explaining his views in that periodical. It will be remembered that in his first article he advocated the claims of Loch Ryan, as, at least, a port of call on this side. It was pointed out in answer to that suggestion that ports cannot be built in a moment and traffic made for ships in the way which Mr. Fleming suggested. He is a railway man and thinks our railways and the port can be compared to the station. However, we need not pursue this point further here. For, without giving up the spot of his choice, he keeps his opinion in this regard more in the background, saying that the question of the favoured port on this side more immediately concerns the Old Country than the colonists. What he really writes again about is the St. Lawrence route. He appears to have got himself very severely handled in consequence of the fault he found with the great Canadian stream. He wishes to explain that he did not mean any personal offence to the river, and is good enough to show how it might still get a bit of a turn even if his ideas — as now amended—were adopted. He would make Sydney, Cape Breton, the summer Western terminus of the mail steamers and thence tranship the passengers to luxurious river boats for conveyance up the St. Lawrence. As the mails would, according to his suggestion, be landed at Sydney, all fears of stranding in the St. Lawrence would be obviated by giving these branch steamers a sufficiently low speed. I should be inclined to argue that passengers would thoroughly dislike transhipment. But that question need hardly be discussed, for the plan of sending them forward in slow vessels from Sydney would effectually prevent any from ever using the route and all idea of attracting passengers to the St. Lawrence would be at an end. His amended scheme is indeed practically the old one. The branch steamer idea is useless and unattractive. I will not further discuss this paper.

But I do want to say something as to an allegation that one of the conditions upon which the new contract is to be based is the provision for the carriage of a certain number of emigrants at a fixed charge of three pounds a head on every trip to the westward. This seems somewhat of a new departure, and it is one which the existing lines may well ask to have re-considered. It is one thing to have assisted passages, as in the case of certain lines plying to Australian colonies. There a certain, and presumably varying, amount towards the carriage of each passenger of certain desirable classes of working people is paid by the Government who wishes to have immigrants. The passengers themselves pay another portion of their carriage. The entire emolument, receivable from both sources by the carrying company, is presumably an amount fixed by the conditions of the steerage trade at the time when each contract is entered into and the price is reconsidered whenever such contract is finished and a new one takes its place. But here things are entirely different. The consideration which the company will receive from the Government, in addition to the nominal amount payable by the passenger, is part of the general subsidy and it is fixed presumably for the whole period for which that subsidy is granted. It must therefore affect the fares payable during the whole of that period to the other, and non-subsidised, lines to Canada and possibly to all Atlantic ports. The steerage traffic of the other lines will therefore go to an unremunerative figure and in ordinary times will be entirely killed. This seems a heavy addition to the competition, which they will undoubtedly feel when the new line gets to work. They will, of course, be deprived of the mails, a large part of the best paying passenger traffic—provided the new company treats its passengers fairly, as one may, of course, assume it will— of a lucrative trade in measurement goods, and last of all, have their steerage rate permanently cut. I should imagine that if the report be true and the tendency of the condition be realized there will be a big outcry against the innovation.

The "Ville de St. Nazaire."

Things have turned out better in regard to this unfortunate vessel than could have been anticipated when I last wrote. But bad is the best. It will be remembered that I said that four boats were got into the water out of her complement of eight, and that one of these had been picked up by the schooner *Hilda*, with four survivors, whilst there was hope that a Glasgow-bound steamer had some others. This hope proved to be well founded. The *Yanariva*, Captain Weston, brought to Glasgow no less than sixteen survivors from the second lifeboat, including the second captain—or, as we should say, the chief officer—the second and third engineers, five seamen, seven stokers and a second-class passenger. The news had hardly been received of the safety of these men when the s.s. *Maroa*, of Liverpool, bound for Hamburg, passed the Lizard, signalling that she had more survivors. These proved to be four in number, and comprised the captain, one of the officers, the chief engineer and a seaman. They were all that were left of nine persons who had got away in one of the whaleboats. Thus the total number of the saved amounts to twenty-four, and there is one boat still unaccounted for, but, there seems little hope of any further news. From the statement of Captain Jageauneau, who commanded the ill-fated ship, it would seem that though the vessel encountered heavy weather and shipped some water, the real cause of her loss was contact with some floating obstruction which wounded her skin in her machinery compartment, and so filled her largest space, at the same time disabling her propelling power and her pumping appliances. The captain and his chief officer and chief engineer remained on the bridge till the last, after having done everything which could be done to save the ship, and after having seen all those with whose safety they were charged placed in the remaining boats. The sufferings through which all the survivors passed seem to have been severe in the extreme. The lesson of the disaster is the danger of floating wreckage and indirectly we may gather how great is the advantage of the subdivision which is given in modern steamers, and which would make it unlikely that a big vessel could have all her boiler and engine power flooded out by any ordinary accident.

A New Channel Steamer.

The Northern Railway of France, which works the Newhaven and Dieppe route in conjunction with our own London, Brighton and South Coast Railway, is about to place a new steamer on the route. She is now completing for them at Havre. She is of the twinscrew type, which is now the rule in first-class channel services. Her accommodation is for 700 passengers of all sorts, and she is to cross in about three hours.

The American Liner "Paris."

has lately been a very unlucky ship. I have for some time mentioned how she has had an overhaul, and then after a voyage or two gone wrong again. On her last westward trip she again gave trouble, though she reached New York on the 3rd April, after a passage of not more than seven days and a third. She was not ready, however, for the next eastward sailing on the 7th April, and that had to be omitted, the British steamer *Majestic* getting the American mail. The *Berlin*, which has been lying at Antwerp since her last trip, came over to Southampton on the 13th, so as to be ready to take up the sailing of the 17th in the *Paris's* place. The *Paris* herself is in dry dock in New York. It is stated by Dalziel's news agency that the starboard shaft gave way in consequence of the wear of the liner. This same wear of the liners of her shafting seems to be the universal cause of all the trouble and expense to which the owners of this vessel have been put through her mishaps.

The Homeward Port of Call for German Steamers.

It will be within the memory of all those who take an interest in the subject that at the end of last year, when the German steamers lessened the number of their sailings for the winter, that there was talk of the adoption of Plymouth as the eastward British port instead of Southampton for the North German Lloyd boats. The report was indignantly denied. The Southampton press not only stated that the report as to the North German Lloyd was untrue, but went on to say that Plymouth was to be deserted by the Hamburg-American Line, who, they alleged, repented their desertion of the Solent. But events have proved stronger than the inspirations—or aspirations—of the Hampshire port. The Hamburg Line has commenced its service again, and is still calling at Plymouth, whilst on the 13th April the *Lahn* made the first North German call there. She landed seven tons of specie, 306 bags of mails, besides her British-bound passengers, and got away within the hour, although she had a formal welcome from the municipal and commercial bodies of the port. The fact that the reception was accorded to her in spite of the lateness of the hour of her arrival speaks volumes for Devonshire enthusiasm, as the call took place at ten o'clock in the evening. The Great Western Railway is doing its best to foster the trade of the Plymouth, and, as Plymouth saves ninety miles of sea trip, or four and a half hours steaming on the fastest vessels using Southampton, it is likely to have a good chance in the struggle, especially when we regard the splendid road-bed and rolling-stock which the Great Western has provided for its patrons. Indeed, the matter seems to have resolved itself into a struggle between the South Western Railway, on behalf of its port, Southampton, and the Great Western on behalf of Plymouth, as to which can offer the greatest inducements to the free lines. The American line is not, of course, open to temptation, being bound to Southampton for something like seven years more. The mayor of Plymouth stated that the accession of the North German Lloyd boats to their port brought the number of homeward-bound steamers calling there up to thirty a month. These include such important liners as those of the P. & O., the Orient, the British India, the West India Royal Mail; Shaw, Savill & Albion, and the New Zealand Shipping Company.

The Channel Islands Accident.

It would obviously be foolish to comment on the circumstances which led up to the stranding of the Great Western Railway Company's steamship *Ibex*, in the absence of fuller information than is at present before the public. Moreover, it would not be proper to do so, as there will undoubtedly be an investigation into the circumstances, involving as they do the characters of both the commodore captains of the rival lines to the Channel Islands, and also the management under which the South Western and Great Western Railways run their steamers. But it is permissible to make some remark upon the injuries sustained by the *Ibex*, and to point out that the severe trial to which she was subjected has proved the excellence of her design and the perfection of her system of subdivision. Had she been a paddler, such as is used by the foreign Channel lines—I except from this remark the newer Newhaven boats of the Great Northern of France Railway—she would never have survived the wounds she received in her machinery compartment, and the results would have been too harrowing to contemplate.

Other Disasters.

A curious legal point seems to have arisen out of the recent stranding of a mail steamer on the coasts of New Zealand whilst on a voyage from London to ports in those islands. The vessel in question is owned by a New Zealand Company, but is officered by gentlemen who have certificates from the Board of Trade. An inquiry was held into the disaster by a Court in New Zealand, and the master found in default. The question arose as to whether a local court could deal with a certificate granted by the Home Government. The Court in this case adopted the course of making the suspension and leaving those interested to question its jurisdiction if they thought it advisable to do so.

The old Cunarder, I may say the oldest Cunarder, the *British Queen*, of 1849, has a vitality proportionate to that of her younger sister, the *Samaria*, which I mentioned last month. She was on fire at Harve in April, and needed the assistance of the municipal brigade to extinguish the conflagration. The poop deck and a lifeboat were consumed. Yet the vessel was got ready for her sailing with little delay, and a few days saw her leaving the Mersey on another trip as though fire had as little effect on her as Anno Domini.

There has been a good deal of ice about this season, and some of the missing steamers are supposed to have been lost through collision with icebergs. The *Brooklyn City* encountered a good deal and suffered damage to her bows in consequence. Fortunately she reached New York in safety, though her fore compartment was holed.

The breakdown, on her maiden voyage, of the first vessel built for the Wilson Furness Leyland Combination was noticed in this column at the time it occurred. The story of her adventures has now been told at some length in the Admiralty Court. She encountered extremely severe weather in her disabled state, and reached the Azores at last in tow of the third vessel that had attempted the job. Her cargo had shifted owing to her

excessive rolling when out of command, and the top of one of her ballast tanks was injured, whilst a certain quantity of water was making its way through the stern gland. An award £8,000 was given to the three steamers which rendered her assistance, the one which finally brought her into safety naturally getting the lion's share, which amounted to three-fourths of the sum I have named. She must be a fine ship to pass the ordeal as she did. But the cost of this disaster would have given her, and perhaps another steamer of equal size, the protection of duplicate machinery.

The Meeting of the Institution of Naval Architects

was remarkable for one matter of private business. This was the rejection of Mr. Pirrie as a candidate for a seat on the council. Mr. Pirrie is a well-known public man. At the present moment he is enjoying his second consecutive year of office as Lord Mayor of Belfast. He, however, seems from his public utterances to take more pride in the fact that he is one of the most important members of the firm of Harland & Wolff, who are probably the largest, and certainly one of the most famous, shipbuilding enterprises in the world. That qualification should have gone a long way to ensure the success of his candidature for such a position as a seat on the Naval Architects Council. Yet, in fact, it was that which contributed to his defeat. Rightly or wrongly, other firms of shipbuilders believe that the Queen's Island firm did not treat the employers' association fairly in their recent dealings with the demands of the men. This naturally made the firm and its responsible members unpopular in the Institute, where the shipbuilding element is so predominant. Speaking of Queen's Island reminds me that

The West India and Pacific Steam Navigation Company

have been lucky in chartering one of their big twin-screw cargo boats to the Union Line. She is, of course, of a far larger and less passenger type than the Union's own intermediate boats from the same yard. But as an extra boat she will fulfil the function as compared with the Union Line's "G's," which the *Raglan* and *Dunolly Castles* of the Donald Currie Line fulfil in relation to vessels of the *Avondale Castle* class, that is, the shifting of large quantities of deadweight at a comparatively low speed and at a very trifling cost.

The sixth of the "G's," the *Gaika*, is now at work, having gone direct from Belfast to the Continental ports at which these vessels load. She will thus make her first appearance at Southampton just prior to her starting for the Cape.

A Veteran of the Merchant Service

died on Good Friday, in the person of Captain Richard Revett. He belongs to the very early days of steam navigation. As long ago as the year 1846 I find a note of him as being in command of the old West India Royal Mail boat *Trent*. That is to say, that fifty-one years ago he was sufficiently high in the service to have attained command of one of the finest vessels in the fleet. This was, of course, the original *Trent*, a wooden paddler of 1,800 or 1,900 tons. She was built in 1841, and became famous in long after years as the scene of the Mason and Sliddell incident, which very nearly caused a war between this country and the United States. But before he took charge of this ship he had had some experience in command in the intercolonial service with its smaller vessels. He was in charge of the West India Company's old *La Plata* at the time of the West India hurricane in 1867, when she had the narrow escape which was the subject of a very striking picture in the *Illustrated London News* of those days. In 1874 he was captain of the company's screw-steamer *Nile*, then a comparatively new ship. On her outward voyage to St. Thomas, with over 200 souls on board, a fire was discovered in the after-hold when the vessel was six days out. Twelve barrels of oil were known to be stowed in the region of the fire, and the memory of the burning of the same company's ill-fated *Amazon* on the same voyage, and much nearer land, must have been vividly present to the minds of all on board. But very prompt measures were taken, and the *Nile* was built of iron with iron bulkheads, while her unhappy protype was all wood. The hold where the fire was seated was flooded to a depth of many feet and in four hours all danger was over. Examination showed how narrow had been the escape of the ship. For one of the casks of oil proved to have been nearly burnt through. Official notice was taken of this incident, and honours were showered upon the captain of the *Nile*. Of recent years he was a director of the Line with which he had so long a connection. But early in 1896 he resigned his seat on the board in consequence of failing health.

The Thingvalla Company of Denmark

seems to be in an unfortunate way. It cannot complain of the year 1896, which the directors characterise as "an average good year." Yet its nett profit was but five per cent. of its gross turn over. A steadily paying British company, with which I make comparison, shows that its nett profit should be somewhere about one-third of its total receipts, if a return to the shareholders is to be made, after providing for insurance and depreciation. Thus one cannot be surprised to learn that directors tell the shareholders that the material is wearing out and no provision being made to renew it. And they go on to say that this state of things, if unchecked, leads to the extinction of the concern. Meanwhile they are trying to make arrangements to reconstruct the company.

The Liverpool and Llandudno Steamship Company, Limited,

has been formed, with a capital of £10,000, for the purpose of running a steamship between the ports named in its title. This vessel is none other than the *Munster*, late of the City of Dublin Steam Packet Company, and one of the three vessels which were to have revolutionised the Isle of Man trade. She opened her new service on the 15th April, and, for some reason or other, did not reach Llandudno till nearly nine o'clock in the evening. The passengers were thus not given much opportunity of enjoying the delights of the sea-side, whilst it was long after midnight before they were restored to the landing-stage at Liverpool. Their return to their homes at such an hour would have to be made either by cab—always a costly mode of progression in Liverpool—or on foot. In either case they would not be likely to forget the experience, and the first excursion trip of the old mail boat could hardly be considered encouraging for future traffic.

A New Method of Steam Propulsion.

The trials of the *Turbinia*,—the little vessel which has been fitted with turbine propellers—have, by all accounts, been wonderfully successful. She is said, in a very enthusiastic account given by a Newcastle paper, to have averaged 31·139 knots on the measured mile. The same paper states that she has not yet done her best. She is, at present, fitted with a 4-in. main steam pipe, which is believed to throttle her steam and lessen her useful power. When a larger pipe is substituted it is claimed that the 200 lbs. pressure, which her boilers easily maintain, will give her as much as 20 per cent. more power in her engines than she can develop at present. Then she is expected to attain a speed of 35 knots. In any case the experiments which have taken place are most interesting, and are well worthy of the attention of marine engineers, shipbuilders and shipowners.

THE ELECTRICAL AND ENGINEERING EXHIBITION AT NEWCASTLE.

THIS exhibition, which was closed on April 24th, after a successful run of ten weeks, was not exclusively, or even to any large extent, a marine one; yet among the novelties shown at the more important stands, there were some items which could not fail to have attraction for visitors interested in marine engineering work.

The stand of Messrs. Crosier, Stephens & Co. occupied a conspicuous position, and was largely taken up with steamship accessories of various kinds, all of which are designed for the attainment of economical results in working. Among these may be mentioned the Meldrum Furnace (marine type) for utilising inferior fuel in steam raising, which is being adopted by many steamship owners, and in all cases with excellent results. There was also a patent filter (the "Harris") for removing grease and other impurities from feed water, besides sight-feed lubricators, ventilating fans, ashhoists, steam traps, injectors, &c. One of the most important exhibits on the stand, however, was "Crichton's" patent high-speed engine (illustrated on page 55), which drove a "Castle" dynamo by Messrs. J. H. Holmes & Co., giving an output of 6,000 watts, at a speed of 550 revolutions per minute. The engine has a single cylinder 7 in.

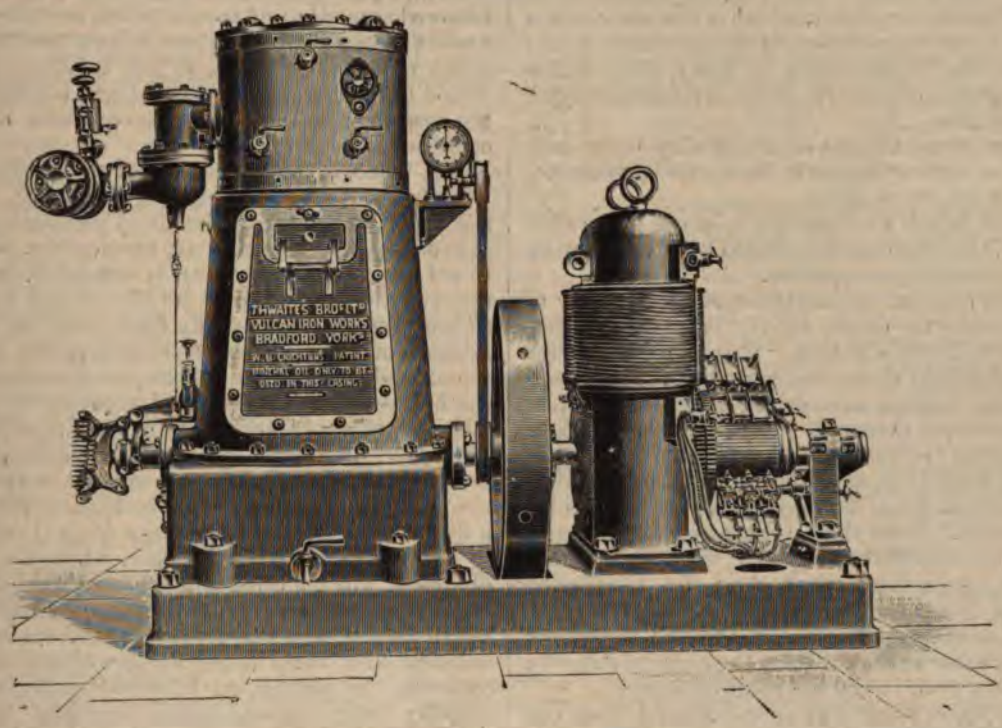
diameter by 5 in. stroke, and is of the true single-acting type, the thrust being always downwards, and such slight wear as takes place being automatically taken up. By a special arrangement of valves, the exact compression required to take up the momentum of the moving parts, can be adjusted to suit varying speeds, and also to suit condensing and non-condensing, thus securing in the latter case an important saving of steam, as compared with any other type of engine yet made. Trials with a small non-condensing compound engine, having 20 I.H.P. at 400 revolutions per minute, show the maximum consumption of water to be 22 lbs. per hour, a result that has not hitherto been attained with so small an engine. The fact that these engines have been kept running 10,000 consecutive hours at the above high speeds, without requiring any adjustment whatever, should commend them to steam users as possessing quite exceptional advantages. All the parts work in a chamber containing a mixture of oil and water, the level of which is shown by a gauge. This arrangement makes skilled attendance unnecessary, the addition of a small quantity of oil at intervals, to make up for waste, being all that is required. These engines have been largely used on ship-board, their capacity for running at high speeds for prolonged periods—not to speak of the smallness of the space occupied—rendering them particularly well suited for this purpose. Messrs. Thwaites Bros., Limited, of Bradford, are the manufacturers, and it may be here stated that the firm have a large number of these engines now in hand, as also centrifugal pumps of a special pattern for the Admiralty, and for several leading steamship owning-companies.

Another very interesting exhibit on Messrs. Crosier & Stephens' stand, was Sinclair's fire extinguisher (chemical and self-acting), which was an indispensable accessory on sea-going steamers, being small and handy, and most effective in use. Sinclair's chemical hand grenades are also extremely useful in an emergency, and should form part of every ship's equipment. The stampings in iron, steel, and bronze, and also the malleable iron and steel castings shown by this enterprising local firm, whose head-quarters, it may be stated, are at No. 2, Collingwood Street, Newcastle, are highly creditable—as specimens of workmanship—to the manufacturers, and are largely used in shipbuilding and engineering work, being superior to hand-forgings, and much more economical.

The stand of Messrs. J. H. Holmes & Co., electric light and power engineers, was very prominent with its equipment of "Lundell" motors, in reference to which some interesting particulars were given in the MARINE ENGINEER for March of the present year.

Messrs. Clark, Chapman & Co. had a very large stand, and exhibited, amongst other products, the new water-tube boiler (Peterson's patent), the special characteristic of which is said to be freedom from priming; and several electrical specialities, including projectors, and coupled engines and dynamos, for ship lighting. Messrs. Ernest Scott & Mountain, Limited, exhibited high-speed launch engines, and engines of other types, besides some important specimens of their products in electrical machinery. The current for lighting the exhibition was supplied by dynamos supplied by this firm.

The contribution to the exhibition made by the Sunderland Forge and Engineering Co., Limited, though not large, was decidedly interesting. It consisted of a ship-lighting plant, comprising a single cylinder, open type, high speed engine, coupled direct to a "Standard" dynamo; a "Standard" dynamo arranged with extended bed plate and heavy fly wheel, for driving by gas or oil engine: a switchboard for ship work, fitted with large contact knife switches; and several other specialities in electrical and general engineering. The exhibits of this firm evidenced ingenuity of design and careful treatment execution; and it is not too much to say that they would bear comparison with the work turned out by the best firms in the country.



"CRICHTON'S" PATENT HIGH-SPEED ENGINE.

The stand of Messrs. Turner Bros., Spotland, Rochdale, contained numerous samples of asbestos and india-rubber goods, including steam and hydraulic packings, seamless flax hose, solid woven-hair belting, &c.; and everything shown was first-class of its kind. This firm is on the Admiralty list, and has achieved a world-wide reputation as manufacturers of asbestos goods.

The only remaining exhibit having special interest for shipping people was the 3½-ton triple-grip stockless anchor, shown by the patentees and makers, Messrs. George Tyzack & Co., South Shields and Sunderland. The popularity of Tyzack's anchors may be judged of from the fact that, in 1896, no less than 500,000 tons of shipping were supplied with them. This, we should think, establishes a record, so far as special types of anchors are concerned.

VENTILATION OF STEAMSHIPS.

IN these days of advancement in hygienic matters, the question of the ventilation of ships is one of great importance, both to the ship-owner and the travelling public. Many ships are plying the ocean with no better ventilating appliances than the ordinary bell-mouthed pipes, which require trimming for every alteration in the direction of the wind. The function of these pipes is to drive down air into the compartments of the ship, which no doubt under certain conditions they do, but it cannot be said that they in any way fulfil the true principle of healthy ventilation, viz.—the withdrawal of the foul air.

For some years past the well-known ventilating engineers, Messrs. Robert Boyle & Son, of London and Glasgow, have carried out a system of ventilation for ships originated by them, which is of such a nature that it cannot get out of order, is independent of any special attention, is self-acting in every part, and is always in action whether the vessel is moving or lying calmly in harbour.

Any system of ventilation on board ship to be reliable must be self-acting, and have no mechanical movement to get out of order.

The system which we illustrate is in use in most of the navies of the world, and has also been adopted by the leading steamship companies.

The main feature of the Boyle system, as most of our readers are no doubt aware, is the combination of Messrs. Boyle's patent "air-pump" ventilator (up-cast) and patent down-cast ventilator. The down-cast ventilator collects and drives down fresh air, no matter from what direction the wind may impinge upon it, while the "air-pump" ventilator by the inductive action of the wind from any quarter continuously withdraws the foul air from the parts of the vessel to which it is connected. Both these ventilators are fixtures, having no movable parts to get out of order, so that trimming is unnecessary, and thus the ventilation cannot suffer from any want of attention. An important feature in these ventilators is that no water can pass down them, and therefore they can always be kept in action, even in the stormiest weather.

Extended experiment has demonstrated that the latest patented forms of these ventilators possess double the ventilating power of the previous forms, so that smaller ventilators may now be used, effecting not only a considerable reduction in the cost, but also a saving in space.

Improvements have lately been made in the system by Messrs. Boyle, and the illustrations here shown explain the system as now modified. Fig. 1 is a longitudinal section of a vessel, and Fig. 2 is a deck plan of the same. Fig. 3 is a transverse section of the vessel.

Fig. 4 shows the "air-pump" up-cast ventilator for fixing on deck, and Fig. 5 the form for fixing on the roof of a deck-house, while Fig. 6 is a view of the down-cast ventilator. In Figs. 1 and 3, the arrangement of ventilators and pipes is shown for distributing the fresh air and extracting the foul air from the different parts of the ship. The air-pump or up-cast ventilators A are connected to the main extracting shafts B, to which are connected the branch pipes C, carried under the deck through the different cabins. The foul air is drawn off through exits D in the extraction pipes C. Partition plates E are fitted at the bottom of the shafts B, to prevent the currents in the branch pipes meeting and creating an eddy, and also to deflect the air up the main shafts. The downcast ventilators F are connected with the main supply pipes G, from which are carried branch pipes H to cabins, saloons, &c. Small vertical tubes J admit the air in an upward direction and so avoid draughts. These tubes are fitted with regulating valves, so that the air supply is completely under control. When desired the air can be warmed by steam pipes placed within the pipes or cooled by means of ice boxes placed within the shafts.

For coal-laden, grain, fruit or cattle ships this system must prove invaluable, and we quite agree with *Engineering* that by its use millions of pounds might be saved annually, and vessels which are known to be in perfect sanitary condition would, as a matter of course, prove of increased value to the owners, as shippers would naturally prefer to send their consignments by the vessels which would preserve them in the best condition.

Fig. 7 shows the application of the Boyle System of Ventilation to the stokehole, involving an entire revolution in the present mode of ventilating that part of the ship, which is not only unscientific, but is found to act the reverse to what is intended, and proves more of a danger than a benefit to the men below, as the open gratings usually fixed over the stokehole, instead of allowing the free exit of the heated air, permit the cold external air to pass in and press down the hot air to the lower level occupied by the men, who are thus constantly kept in a strata of hot vitiated air. With the Boyle system, these gratings are done away with and everything made tight at the top. On one side of the stokehole, at the highest part, is fixed a downcast ventilator F, having a shaft G carried down to about four feet from the floor, where the air is discharged. On the other side of the stokehole is fixed an "air-pump" up-cast ventilator A, which draws off the hot air, at the highest level, to where it naturally ascends, and there being no downward pressure of cold air, the heated air is drawn away with great rapidity, being replaced at the floor level by fresh air supplied by the down-cast ventilators. By dispensing with the top gratings and having everything tight above, water is also prevented from passing below, which is another important point. The bunkers may also be ventilated with the same shafts that are used for the stokehole, or they may be ventilated by separate ventilators.

Messrs. Boyle have received many valuable reports in favour of their system from high naval and scientific authorities, including one from Lord Kelvin, and also from a First Sea Lord of the Admiralty. The system has been awarded, by the Worshipful Company of Shipwrights, the prize of £50, offered for the best system of ventilation for ships. The Royal Commission on the Ventilation of Ships, and His Royal Highness the Duke of Edinburgh have also expressed their approval of the system, specially commending its simplicity and economy, and from what we ourselves know of it we have pleasure in endorsing these commendations,

though the world-wide reputation of Messrs. Boyle & Son as ventilating experts is a sufficient guarantee that their system will be found to fulfil all requirements. As founders of the profession of ventilation engineering they have raised the subject to the dignity of a science.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

The Institution of Naval Architects.

THE meeting of the Institution of Naval Architects, held in the beginning of the month, was a thoroughly successful one. The papers read were nearly all of exceptional interest, and that of Mr. Durston, read on the first day of the meeting, was declared by one of the gentlemen present to be the most modest record of a great achievement that had come under his notice. The paper read by Admiral Fitzgerald was in a sense complementary of the former paper. The Engineer-in-Chief described the satisfactory and successful nature of the trials which have taken place with the new boilers, Admiral Fitzgerald explaining why it was that naval officers find so much to admire in their substitution for the older type. Mr. Thornycroft congratulated the authorities upon the success of their experiment, but pointedly remarked that we must not take it for granted that the Belleville is the best or final type of this kind of boiler. Mr. William Laird spoke out of his own experience with 90,000 H.P. of tubulous boilers other than the Belleville, and according to his statement these had proved highly satisfactory. A deal of unfavourable criticism came from Mr. Moss, who, judging from his remarks, sees very little worth praise in what the constructive or engineering branches of the Navy undertake. Mr. Manuel, of the P. & O. Co., considered Mr. Durston's paper to be as instructive to the Mercantile Marine as to the Navy, but several of the gentlemen present disagreed with him on this point. However, the general opinion seemed to be that while water-tube boilers are the most suitable form of boiler for naval purposes, the old cylindrical boiler was, at all events for the present, the best for the passenger lines.

Mr. A. J. Durston on Water-tube Boilers.

The Engineer-in-chief of the Navy in his paper read at the Institution of Naval Architects stated that throughout the trials of the cruisers *Powerful* and *Terrible* the behaviour of their boilers was entirely satisfactory, and fully realised the expectations of the Admiralty, and practically no defects were developed. A few lead plugs were blown out in one vessel which was accounted for by their being too loosely fitted, but when refitted they gave no trouble whatever. Also a small copper pipe connecting the feed regulator with the lower part of the element of one boiler gave way and had to be renewed, but beyond these defects no trouble of any kind was experienced. When working at the highest powers, the decks and casings in the vicinity of the uptakes were heated to an undesirable extent, but when lagging was fitted, as had been originally provided for in the specification, there was no further trouble from this cause. A great advantage was secured in the large-tube type boilers, as those of the *Powerful* and *Terrible*, by the interiors of the tubes being so much more conveniently and quickly examined, and their condition ascertained than in the small tube type. The boilers of the *Powerful* and *Terrible*, said Mr. Durston, would compare favourably with the old type of cylindrical boilers as regards consumption, endurance, and facilities for examination, and in all other respects for their particular application to the purposes of a warship they were superior. Admiral Fitzgerald's paper was generally deprecatory of the old style of marine and Scotch types of boiler for warship use, and was in favour of water-tube boilers throughout. As an argument in favour of the adoption of the latter type of boiler, he instances the case of the weight of the boilers of the *Powerful*, which by the adoption of the water-tube class of boiler has saved nearly 700 tons.

Reconstituting the Channel and Mediterranean Squadrons.

The Admiralty have under consideration a scheme for the reconstitution of the squadrons now in the Mediterranean and Channel. If carried out this will mean that the battleships *Empress of India*, *Repulse*, *Resolution*, and *Royal Sovereign* will replace the *Anson*, *Rodney*, *Camperdown*, and *Trafalgar*, which are at present in the Mediterranean. It is expected that four new battleships of the *Majestic* type will be put in commission to fill up the vacancies caused. In the completing stage at the different dockyards we have the *Cæsar* and *Mars*, the *Hannibal*, *Illustrious* and *Jupiter*, in addition to the *Prince George* at Portsmouth and the *Victorious* at Chatham, which have only recently reached completion. If the Admiralty replace the four ships, which are transferred to the Mediterranean, by five, which will be according to the proposed programme, this will bring the strength of the Channel squadron up to a battleship strength alone of seven. The ships removed from the Mediterranean will come home for a complete refit, and will be made ready to relieve the vessels of older type in the reserve squadron. Towards the end of this month the new cruiser *Pelorus* is to relieve the *Bellona*, the former being considered more valuable as a fighting ship as well as scout. She displaces 305 tons more than the *Bellona*, besides having a greater speed, a much superior armament, and a coal-carrying capacity nearly double that of the latter. The *Bellona* will be taken in hand at Portsmouth, undergoing an extensive refit at a cost of over £41,000. Nearly half of this will be spent on her hull, fittings, and equipment, and the remainder on her machinery, which will include a new set of water-tube boilers. After the manœuvres the Channel squadron will also be strengthened by the cruiser *Arrogant*, now completing for sea at Devonport.

Presentation at the R.N. Engineering College.

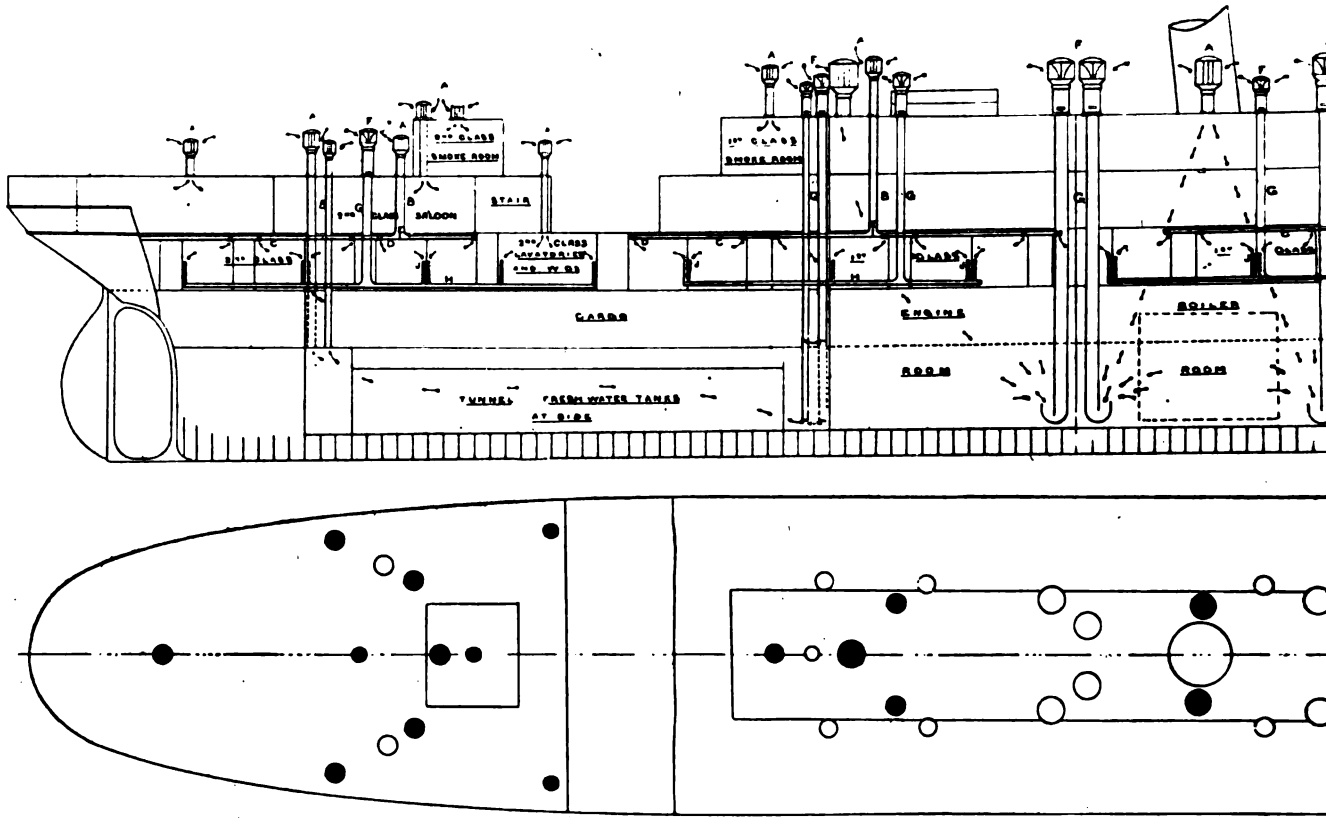
Admiral the Hon. Sir E. R. Fremantle presented the prizes won during the past year by the students of this college about two weeks ago, just before they proceeded on Easter leave. The Admiral was accompanied by Lady Fremantle and Admiral Carr, superintendent of the dockyard. He was met by Commander Grenfell, Mr. Mayston, the chief engineer of Keyham Factory, and the masters of the college. After the prizes had been distributed, Admiral Fremantle delivered a brief address to the students, impressing upon them the great desirability of taking every possible advantage of the instruction given by the college, which had a staff of the most competent officials, and expressed his gratification with the report of their conduct, which he considered to be highly satisfactory. Five prizes were given for general progress, and also for the best papers in the summer examination, and fourteen students received prizes for progress and skill in workmanship.

Portsmouth Dockyard.

Recently at this yard there has been a slight lull in the bustling times which have been the natural wind-up to a very busy financial year. But it is the lull which precedes a very busy period. The armouring of the *Cæsar* is now complete, and the work on her is being steadily pushed forward. The *Mars* is engaging special attention, and much overtime is being put in on her, so that she may be ready for sea by the first week in June. The progress made with the *Ocean* at Devonport is watched with great interest here, and the accident which happened to her is regretted by all, as it is expected that it will be some time before Devonport regains the ground she will have lost, and now it will be almost impossible for her to catch up to the *Canopus*. By the beginning of this month the new pigeon loft at the Clarence Victualling Yard will be completed, and nearly a hundred birds will be installed in it to begin with. It is a most complete loft in every respect. The Bluejackets and Marines who are to take part in the Jubilee celebration on the 22nd of June are to be sent from this port under the command of Captain W. H. May. Of course the great day here will be the 26th. The torpedo-boat destroyer *Ranger* is being specially prepared for the use of the Prince and Princess of Wales, and quite a yacht-like appearance will be given to the vessel on this occasion. The defect which was discovered in the *Star* while on her machinery trials turns out to have been more serious than was expected. On examination it was found that one of the propeller bosses was badly cracked. A very serious accident must have happened if the accident had been allowed to go unchecked, for the engines at the time were making 395 revolutions per minute.

Captain Mahan's "Life of Nelson."

A close study of this splendid work reveals the wonderful



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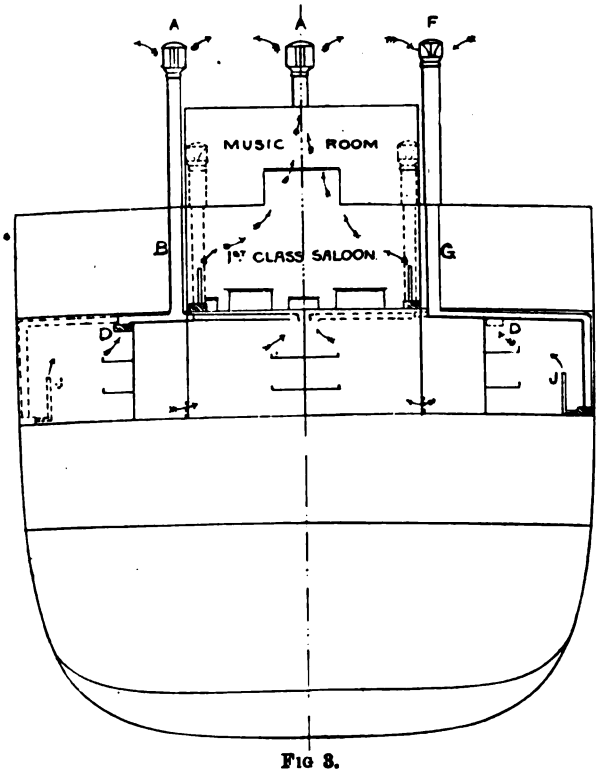

FIG 3.

FIG. 4.

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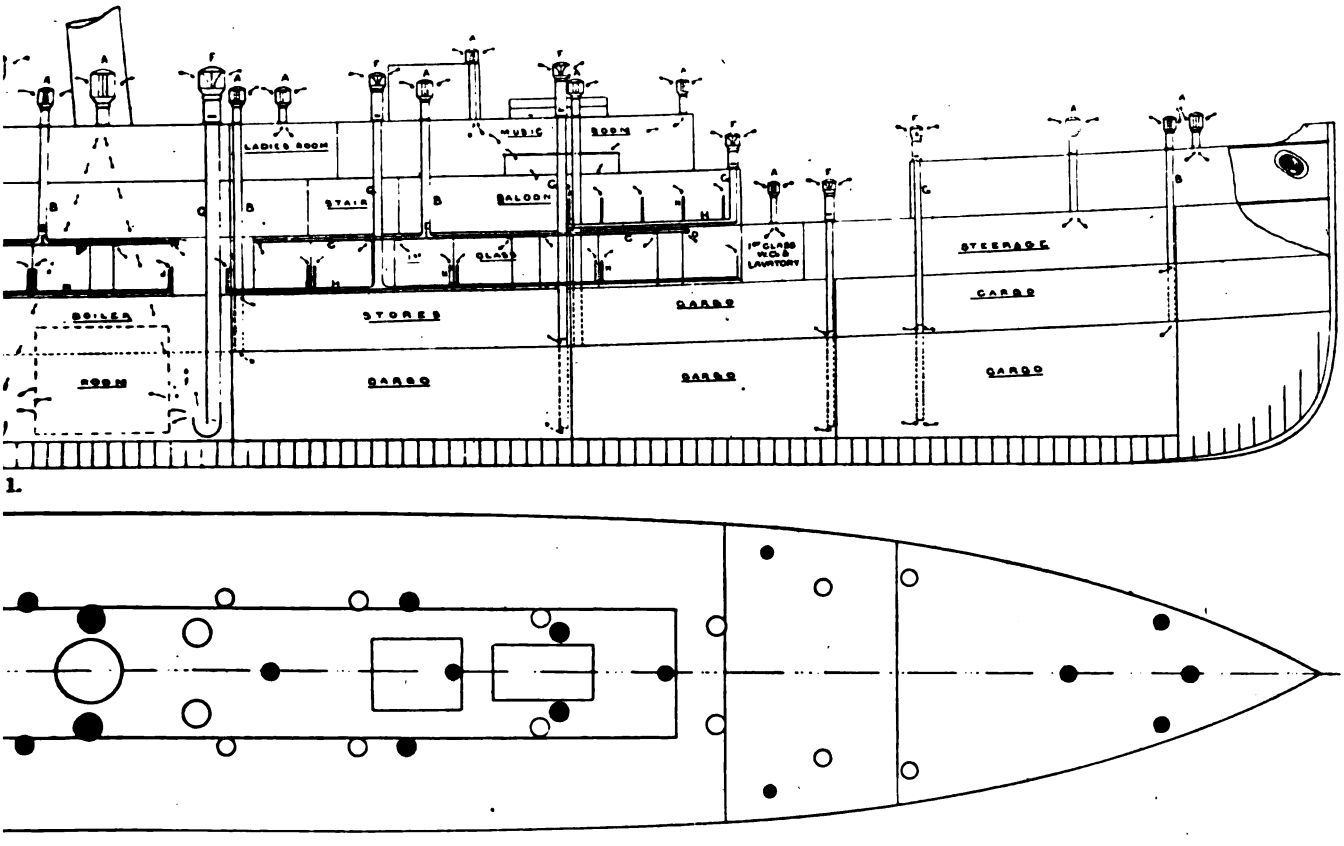

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FIG. 6.

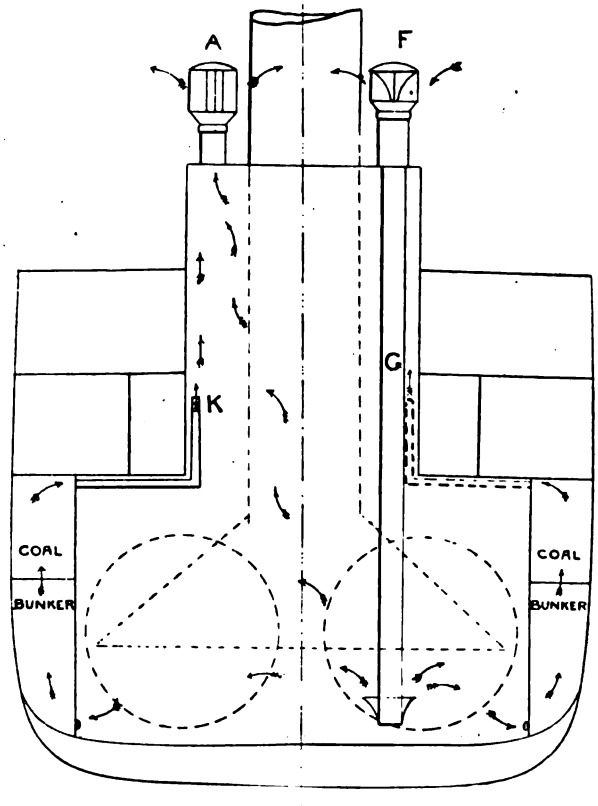


FIG. 7.

power which the author has as a biographer, a taste of which we were given in the brilliant monograph which Captain Mahan wrote upon the life of Farragut. The book is a scholarly and accurate study of the great Admiral's correspondence, which it analyses in order to detect the leading features of temperament, traits of thought and motives of action which this correspondence reveals. The study is a close and complex one, the interest growing stronger and stronger as the history proceeds. A special feature is made of Nelson's love of honour and glory, as well as many examples of his great courage and hardihood. Hoste, one of his midshipmen at Santa Cruz, wrote: "When I beheld our boat approach with him who, I may say, had been a second father to me, his right arm dangling by his side, while with the other he helped himself up the ship's side, and with a spirit which astonished everyone, told the surgeon he must get his instruments ready, for he knew he must lose his arm, and that the sooner it was off the better." Many other instances are given of Nelson's courageous spirit, and of his tenacity of conviction and fixity of purpose. Nelson's intimacy with Lady Hamilton is dealt with in a fair, dispassionate spirit, and her influence upon his career is neither heightened or diminished. In Captain Mahan's opinion Lady Hamilton was the woman of conspicuous beauty and consummate art who administered to Nelson a rank and heady draught of flattery which he was powerless to resist. The author has in short rendered a distinct service to naval literature. The book contains many good portraits of Nelson, and many excellent battle plans.

French Naval News.

Vice-Admiral Besnard's Bill for the reconstruction of the French fleet has been laid upon the table of the Chamber. Its object is to get a grant of 80,000,000 francs, so that the French Navy may be put upon an equal footing with those of the other European powers. Admiral Besnard, in his preamble to the Bill, asserts that there is urgent need for the Government to begin the construction of a 12,000 ton ironclad, four cruisers of 7,500 tons, and two of 2,500 tons, four torpedo-boat destroyers, and nine coast defence torpedo boats, the cost to be defrayed by six instalments in the yearly budgets between now and 1902. If these demands were granted Admiral Besnard considers that the whole of the programme would be realized by 1905, and he urges that the great activity in the dockyards of other countries gives weight to his Bill. The amount of money voted for coal for the French Navy for 1896 appears to have been either underestimated or else there has been a too lavish use of it, for Admiral Besnard has just issued a circular drawing attention to the fact that greater economy in the consumption of coal this year must be observed. The flagship of the French Northern Squadron, when entering the arsenal at Cherbourg, unfortunately touched upon a rock, and sustained a rather severe injury. She is now undergoing repairs which will probably last a month. The new first-class battleship *Charles Martel* had the misfortune to meet with an almost similar accident, but the damage in her case was trifling, and she was able to continue her trials. The armoured first-class cruiser *Pothuau*, having completed her trials, has been placed in reserve, ready for sea at four days' notice. The first-class battleship *Massena* is now ready for completion and trials.

Chatham Dockyard.

Rapid progress continues to be made here with almost all of the work we have on hand. The *Illustrious* is fast approaching completion, and every effort is to be made to have the *Jupiter*, her sister ship, completed by the 1st of June, and should her armament arrive in time there is every reason to believe that this desire will be accomplished. A large staff is at work upon her, and much overtime is being put in. The *Goliath* is making fair progress, and up to the present time an average of over 100 tons per week has been worked into her, close upon 2,000 tons have altogether been built into the vessel. It is expected that the present financial year will not be quite such a busy one as that which has immediately preceded it. For instance, there has been a reduction in the labour grant of close upon £40,000. £69,940 is to be spent upon the *Illustrious* this year and £68,400 upon the *Vindictive*, both of which are to be completed before the end of the year. £104,500 will be expended upon the *Goliath*, and only £7,000 upon the *Jupiter*, and the *Isis* and *Jupiter* will have £3,500 and £3,300 spent upon them respectively, which will complete them for sea. Several vessels are down too for extensive repairs, among which are the *Rodney*, which will take up over £17,000, over £13,000 to the *Dreadnought*, the *Arethusa*, £14,356, and the *Tartar*, *Mohawk* and *Hebe*, all three of which are to have some thousands spent upon them. The river Medway here has been greatly improved since the formation of the Conservancy board. A line of gas buoys has been laid down in the river between Chatham and Sheerness, and vessels can now go up and down without hindrance of any kind. No matter how dark the night, battleships and merchant vessels can now navigate the Medway in safety.

The Re-armament of the Older Ironclads.

The paper read by Lord Charles Beresford at the Institution of Naval Architects, on the advisability of re-arming our older ironclads, raised a great deal of discussion. His remarks were confined to the seventeen vessels out of forty-five which are armed with obsolete muzzle loaders. Lord Charles does not propose to make any structural alterations in the vessels, the alteration he proposed having to do almost solely with the magazine accommodation and arrangements necessary to ensure the certain and rapid supply of quick-firing ammunition. He reckoned that the cost of these alterations, together with the new guns, would require an outlay of about £1,100,000, of which sum £900,000 would go to cover the cost of the guns and their mountings. Lord Charles argued that to spend this money in the way suggested by him would be well worth our while, and summarised his conclusions as follows. 1. That to retain obsolete and slow vessels armed with muzzle-loading guns in the A or B division of the Fleet Reserve is misleading to the public. 2. That these vessels could never be of use in war time, even after the first line had been destroyed, as all possible opponents are armed with breech-loading and often with quick-firing guns. 3. That all possible opponents would therefore have them at their mercy by superior range and projectile power. 4. That the money spent yearly on care and maintenance and repairs is absolutely wasted, as they would be of no use in time of war. 5. That at a cost equal to that of one modern battleship and one cruiser, seventeen of these vessels could be rearmed and made effective fighting units. 6. That their construction is rigid enough to stand the extra strain thrown upon them, and that the alterations proposed are practicable. They are seaworthy and stable, and their belt of armour would, if combined with equal hitting power, which at present they do not possess, make them formidable antagonists even to more modern vessels.

German Naval Matters.

The rejection of the German naval programme, according to the German Press, is due to the interested work of political parties; but it is stated that the great firm of Herr Krupp will build the ships, and in case they should be refused by the German Government they will be sold to foreign powers. There is little doubt that by the time they are finished, that is, if they are commenced at all, the political parties in question will have become reconciled by one means or another to their being bought by the Government. Herr Krupp is to have the building of the new station cruiser "G," which will be laid down at Kiel. Early last month a new second-class cruiser, the *Victoria Luise*, late the "L," was launched at Bremen, the Hereditary Prince of Oldenburg presiding at the ceremony in the name of the Emperor. She displaces 5,650 tons at normal draught, with 500 tons of coal on board, and her length is 344 ft., breadth, 57 ft., and draught, 20 ft. 6 in. She is protected on the chief gun positions by four inches of Harveyed steel, and has a 4-inch steel deck. Her armament consists of two 8-in., eight 6-in., ten 34-in., and ten 14 quick-firers and four machine guns, with three submerged torpedo tubes. Her engines are capable of twenty knots with a 10,000 H.P. Her crew consists of 440 men. The Prince of Oldenburg, in a speech at the lunch afterwards, attributed the new type to the professional knowledge of the Emperor, and expressed the hope that many others of her class would follow.

Devonport Dockyard.

Mobilising arrangements in connection with the Jubilee Review seems to occupy most of the time here, and it is fully expected that the Review this year will be on a scale of unparalleled magnitude. Active preparations are going on here on the selected vessels, which will hoist the pennant in about another month's time. Devonport's contribution will consist of a large number of ships and men, and accordingly great efforts are being made to have plenty of men handy. Numbers of men will be returning from the foreign stations, so that although the fleet which will be mobilised will be greater than

that of other years, it is anticipated that no difficulty will be found in manning them. The great strides which were being made in the building of the *Ocean* received an unexpected check about a week ago owing to a part of the framework of the vessel tumbling in. Fortunately, and at the same time miraculously, no injury or loss of life was to be reported. The collapse may be due to other causes, but it is generally assigned here to be the craze for rapid work in connection with the lowering of the shipbuilding record. It is to be hoped that the other two yards which have battleships under construction will take heed of this and not sacrifice efficiency to speedy construction. The progress of the three battleships building has now reached an interesting stage. The *Canopus* has a slight lead, but the difference in the weight of the material built into the Portsmouth ship and the *Ocean* is gradually becoming lessened. The *Goliath* is to all purposes out of the race although she is credited with a six week's start and the advantage of being better equipped for her task. The coastguard vessels *Collingwood*, *Colossus*, *Benbow* and *Melampus* are undergoing a refit, and among the other work in hand may be mentioned the *Sharpshooter*, which is having a slight overhaul, and the completion of the *Renown*, *Magicienne*, *Juno* and *Doris*, which will take part in the coming demonstration of our naval strength.

To Increase the Speed of Ships.

A simple and comparatively inexpensive device for this purpose and for preventing barnacles and corrosion, is to be tested by the United States Government. The mechanism of this invention envelops the submerged portion of a ship with a film of oil, thus reducing friction and overcoming to a large degree the resistance of the water. By its means, too, it is said to be quite possible to carry oil under the surface of the water. Without the slightest augmentation of machinery or extra expenditure of fuel the inventor claims to increase the speed of vessels 25 per cent. by his idea. The necessity of dry docking and scraping will also be done away with. The oil used is crude petroleum, and the system is so arranged that in rough weather a large quantity of the oil can be discharged along the sides of the ship, and distributed over the surface of the water, thus providing a more effective method of greasing and smoothing high seas than any yet devised. The covering composition is an oleoginous preparation of tallow, calcined carbon, and several other ingredients, which the inventor keeps secret. He claims that it hardens in the water and cannot wash off, and that it is possible to apply it to submarine war projectiles, permitting double velocity. The Assistant Secretary of the United States Navy has appointed Chief Engineer G. Cowie to report on the invention to the department.

Salt Water for Boilers.

The trials which Messrs. Yarrow have been carrying out in order to ascertain the effect upon their patent boilers of feeding them with salt, as an alternative to fresh water, appear to have excited a good deal of attention among naval engineers. It is not definitely known yet whether the trials with the Express boilers were entirely successful, but, supposing they were, the result would indicate many advantages, including possibly an increase in the speed of vessels. Experts have always been of opinion that the inside of the tubes would become encrusted with the salt and so get quickly stopped up, but Messrs. Yarrow are doing their best to prove this theory wrong. They have been running a torpedo boat fitted with one of their boilers, with tubes only an inch in diameter, using sea water only. The vessel was at sea for five consecutive days, steaming for eight or ten hours daily. The boiler was opened after each trial and it was found that little or no injurious effect had resulted from using the sea water. The experiments were chiefly carried out to show that in cases of emergency it was possible to use salt water in the straight tube Express boiler for a considerable period.

Sheerness Dockyard.

Work at this yard received somewhat of a check at Eastertime owing to the employees being away holiday-making, but in many departments work has been carried on right through the holidays. On the *Pelorus*, for instance, the fitters have been at work all through in consequence of her being somewhat backward in the date of her departure for her experimental trials. A defect which was discovered in one of her condensers gave a considerable amount of trouble and was partly to blame for the delay. About the same time an accident happened to the torpedo-boat destroyer *Contest*, when returning from night practice, she having run aground on the West Shore. The gunboat *Slaney* also collided with the port guardship *Sans Pareil*, being carried by the flood tide on to her bows. The day after, a passing steamer fouled the *Seamew*, carrying away her bowsprit. Work generally pursues its usual course, but there is a decided pressure of overtime on the *Swallow* and *Barracouta*, and this pressure of work will be continued until these vessels are ready for sea. The transfer of the training of stokers from this yard to Chatham is thought to be a distinct advantage, as for some time past there has been a difficulty in finding accommodation for the men, which has been temporarily overcome by finding them berths on the *Sans Pareil*. Refitting is now the principal work here, both the *Swallow* and *Hotspur* being under repair, although in the latter case overtime has not been resorted to to get her ready. The *Circe* is having her defects made good prior to her taking up her duties in the North Sea. Three of the torpedo-boat destroyers are in hand, and the *Swordfish* is also having a few defects made good. The *Ruby* has just had her guns removed, and her disarmament closes the career of the "Gem" class of cruisers.

Pembroke Dockyard.

Most satisfactory trials have been carried out on the *Hannibal* here, the preliminary trial of her propelling engines being voted a success, the engines being kept working for some hours. The delay which occurred was owing to one of the side valves of the starboard engine giving out during the first water test. An outline of the future arrangements which the Admiralty have given their approval to has been received here, and has caused much adverse criticism. According to these arrangements the *Hannibal* is to remain at Hobbs Point until ready to be sent to Portsmouth in October next, that she is to be masted and rigged at this port, but that her guns are not to be shipped until after her arrival at Portsmouth. The *Andromeda* when launched is to be taken to the moorings now occupied by the *Thunderer*, and this vessel to proceed to the Wear Buoy, and as soon as the *Hannibal* departs the *Andromeda* will occupy her position and the port guardship return to her present moorings. The keeping of the *Hannibal* at Hobbs Point is held to be a mistake. Most of her heavy gear, which it would have been more expedient to have shipped at Portsmouth, is already on board, but the boilers and engines of the *Andromeda*, which include many weighty pieces, will now have to be put aboard after she gets afloat. That being so, the advantage to be gained from berthing the latter under the sheer legs for a time can be plainly seen. We have now received the detailed plans for the new jetty, on which sheer legs to lift 130 tons will be fitted.

Fresh Fruit from Queensland. — About thirty cases of mangoes and pineapples from Queensland have lately been landed from the British India Co.'s s.s. *Jumna*. The fruit is sent as presents to several persons of note, and some of it has been forwarded to Cimiez for the Queen. The fruit, which was landed in perfect condition, was preserved by means of a Linde refrigerating machine. The distinctive feature of this system is a continuous circulation of pure cold air, free from moisture, and as the voyage from Queensland is the most trying of all, it seems to have effectually solved the problem of the importation of fruit through the Tropics.

King's College, London.

We have received a syllabus of the classes and instruction available for students during the session 1896-7. The student will find that he can suit his study to his personal convenience and to his other engagements, for there are both day and evening courses. The subject of architecture receives considerable attention. There is a time table for a three years' course, in which many kindred subjects are included. Drawing, chemistry, physics, mechanics, mineralogy, follow of course, as do civil engineering and building construction, and in the third year such special subjects as plumbing and ventilation, but divinity—save in so far as it may have a bearing on ecclesiastical architecture—seems rather outside the curriculum. In the evening course there will be lectures established by the Carpenters' Company on architecture, and a good deal of attention is devoted to the study of wood carving. The fees are low, and even those who may not desire to follow out these studies in their subsequent life work may find that attention to them will expand the mind, and give very interesting and valuable information which may afterwards be useful in any walk of life.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from March 27th to April 24th, 1897:—

Alton, G. B., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Collingwood, R., engineer, has been promoted to the rank of acting chief engineer in Her Majesty's fleet.

Collingwood, Richard, acting chief engineer to the *Hazard*, to date February 8th.

Curtis, F. T. W., chief engineer to the *President*, additional for service as resident overseer of gun mountings at works of Messrs. Whitworth & Co., Manchester.

Dalrymple, John H., engineer to the *Barfleur*, additional for the *Dragon*, to date March 29th.

Edwards, R. W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Graham, Walter J., chief engineer to the *Phœbe*, to date March 29th.

Guyatt, E. G., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Guyatt, Edward G., chief engineer to the *Sylvia*, to date February 18th.

Guyer, Thomas S., engineer to the *Otter*, to date March 26th.

Hutchings, Frederick H., engineer to the *Victory*, additional for the *Dasher*, to date April 17th.

Ludgate, W. G., engineer to the *Pembroke*, additional for the *Grasshopper*, undated.

Organ, Joseph, fleet engineer, has been placed on the Retired List of his rank.

Pendleton, Frank R., assistant engineer to the *Victory*, additional for the *Hannibal*, to date March 29th.

Reynolds, Thomas R., engineer to the *Crane*, to date March 26th.

Screech, Samuel A., chief engineer to the *Vivid*, additional for the *Pyramus*, to date April 21st.

Shorey, Charles E., engineer to the *Trafalgar*, to date March 29th.

Smith, Edgar C., assistant engineer to the *Wildfire*, additional for the *Sans Pareil*, to date April 21st.

Spry, F. M. D., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Stewart, Charles Edward, staff engineer, has been placed on the Retired List of his rank.

Tilbrook, Charles F. H., chief engineer to the *Victory*, additional for service with gun and torpedo-boat, *vice* S. A. Screech, to date April 21st.

HOAR & BROWN'S HARDWOOD MARKET REPORT, APRIL 24th, 1897.

Teak Log.—The deliveries during the past four months have been fairly well up to the standard. Prices have remained firm, but without any advance, and the stock is unchanged, but a considerable quantity consists of second-class quality, and holders of good stock are anxious to put aside a proportion for their regular London and country customers. Enquiries from the Continent have been freely circulated, but the London market up to the present have been largely unsuccessful.

The near floating supply of good shippers is comparatively small, but parcels are continually arriving more or less of doubtful quality, making it difficult to guarantee supply for forward contracts.

Values for first-class timber are not likely to experience a downward movement while the arrivals are so unsatisfactory, but lower prices may be heard of for the inferior parcels.

Planks.—The stock has become very small in comparison with the past, but from 1,500 to 2,000 loads is ample for the London consumption, and upon the stock exceeding these figures prices are always known to immediately decline. At present the outlook does not warrant any fall in values.

Mahogany.—Stocks are light, the supplies have been of a meagre character, and prices at auction have remained firm. Honduras.—Buyers are eager to take up both large and small sizes, and there is little remaining unsold. Tobasco.—The late importations are of poor description, but purchasers were easily found to take it all. The stock on hand is small. Nicaragua.—The demand is good, but at lower prices than of late in consequence of the interior condition that most of the parcels arrived in. Minatitlan.—The market has been pretty bare for some time, large to medium sizes have sold well, and some further stock is wanted. Panama.—Sound logs are in good demand, and the inferior qualities (considering the very bad condition of late importations) have sold well. African.—There is an increasing demand, and prices have become much firmer both for large and smaller sizes.

Cuba.—Since the last public sale there is little left in dealers hands, prices are high and likely to remain very firm, the arrivals are expected to be limited.

St. Domingo.—Only small logs can now be obtained at the docks, and the prices are fully high. A cargo arriving of sound and sizable selection would at the present moment realize a handsome profit to the shippers.

Cedar.—The importations have been limited, but enquiries among the cigar-box trade have for some months been light, there is plenty of cheap cedar in the market from Paraguay, which keeps down the price of other qualities.

Sequoia (Californian Redwood.)—The quantities forced upon the market without reserve would have at any other time been more disastrous, and as it happened the prices dropped from 2s. 3d. to 1s. 9d. for the time being, but for the next few months stocks are likely to remain light, and prices may steady themselves again.

Kawrie Pine.—The business increases and provided stocks are kept short enough to allow the markets to be properly fed the importers will reap the benefit.

American Walnut Wood Logs.—The large unreserved sales have cleared off a quantity of second-hand goods of low class at inferior prices, but the stocks of this quality is still sufficiently large for requirements. There is a demand for large prime wood, and good prices could be obtained. Planks and Boards.—Second-class stocks are heavy, and prices weak, the better qualities are more sought after and realize better profits.

Greenheart.—Very little enquiry about and prices appear weaker.

Padouk.—No fresh arrivals to report, the values keep firm for good sound, square, well-coloured logs. Some public sales of badly converted and rejected timber have taken place lately, but the support was weak, and the realization must have shown a loss upon the shipping prices.

Business of late has been strained by the high prices, and much of the hand-to-mouth policy is noticeable.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

It is to be regretted that the consultations which have extended over the greater part of two weeks between representatives of the Engineer Employers' Federation and of the Amalgamated Society of Engineers, have failed to settle the main question, the principal object for which the conference was brought together. It is a question that has been brought up, for the last quarter of a century or more, at stated intervals by the men, viz., the working of machines, which remains exactly as it was a month ago—not the slightest progress having been made towards a settlement. The representatives of the A.S.E. were invited to suggest a solution of the difficulty. They proposed that a local committee should be established in each district, to which all questions regarding machines could be referred; the committee to consist of an equal number of employers and men, and also that the Board of Trade might be asked to arbitrate in the event of the committee failing to settle a dispute. To this the employers intimated their inability to accept, Colonel Dyer, chairman of the conference, giving clearly the position of the Federation in the following remarks:—"We have considered your proposals as to machines very carefully, and regret to say that, in our interests, in those of other workmen, in the interests of the general trade of the country, and, as we believe, in your own permanent interests, we can see no prospect of our members accepting your proposals or making any counter-proposals on the lines you have indicated. The employers are at all times willing to meet the members of your council to discuss, and, if possible, to arrange any ques-

tions which may arise, and they are willing to appoint members to serve on local boards to arrange general rises and falls of wages. They cannot, however, delegate any further authority to the boards you propose, or invest them with the power to interfere with the internal management of the works. Under the existing management of the mechanical works of the country, the engineering trade has steadily increased in volume and importance, and there is therefore no valid reason for altering a condition of things which experience has proved to have been successful for other arrangements which, the employers feel, would be fatal to the interests of all."

The A.S.E. representatives again brought this question forward, asking the employers if they could not see their way to make some counter-proposals. Colonel Dyer, in replying, once more emphasised the position taken up by the Federation, submitting to the engineers' representatives the following statement:—"To make clear to you the reasons which have influenced the executive of the Federation in not making a counter proposal, we wish to mention one or two points which we think will show you we had no other course. The first point is, that in accepting Clause I. of your proposal (that providing for the appointment of committees) the whole existence of the Federation would be brought to an end—in fact, if you look fairly at your proposal you will see at once that it amounts to a suggestion to supersede the Federation by committees practically controlled by outsiders. This in itself is a fatal objection. We cannot for one moment allow anything to weaken our Federation or interfere with its functions. The second objection is partly included in the first, and is, that your proposals introduce the principle of allowing outside arbitration to take control of the management of our works. This we cannot concede. With such vital differences between us, we felt it would be useless to attempt to make any counter-proposal. Such a proposal from us would be so entirely incompatible in principle and intention with yours, that we felt the two could not be discussed by us together with any hope of bringing them into line. Besides this, during our consideration of your proposals it became evident to us that any counter-proposals on our part which would necessarily retain the Federation as supreme on our side would simply bring us back to practically our present position—viz., that of having local associations on our side, and district committees on yours, to deal with disputes, and with the Federation on our side, and the A.S.E. Council on yours, as final appeals. As these organisations already exist, and as their aid can very readily be invoked by either side, no counter-proposal was needed to bring them into being. We wish to disclaim any discourtesy in not having any counter proposals to bring forward. It was only after full consideration of your proposals that it was seen we were practically shut up to the course we have adopted. If you have any suggestions to make which would facilitate the working of the existing local organisations, and which would not involve the principles which your present proposals introduce, and which are objected to by us, we shall be most happy to fully consider them. but at present we do not see where the good can be done by creating committees in addition to the existing organisations, which are almost identical in character and scope with those you suggest."

This statement was the last reference to the machine question, but further communications are to be sent by the Employers' Federation to the A.S.E., and by the A.S.E. to the Federation, and although the conference has separated, there is still hope in the amicable attitude which prevailed. The other two points, one, that of trial-trip wages and allowances, which was regarded as second in importance, was settled on a liberal basis, the men with torpedo-boats and destroyers are to have, in addition to shop wage and over-time allowance, a bonus of 5s. for the builders' preliminary trials, 5s. for the builders' final trials, and 10s. for the official full-power trials. With other warships slightly less rates are to be paid. There is to be a bonus, in addition to the shop-time, for every hour the engineer is on board or in attendance, on vessels delivered at ports other than where they were built. The remaining question, that of overtime, was also amicably settled, the conference agreeing that the ordinary work and overtime of any operative shall not be allowed to exceed 248 hours in any four weeks, save in cases of emergency, breakdown, or repairs. This agreement is to have a six months' trial.

Messrs. Wm. Simons & Co., Limited, Renfrew, have received an order to construct two large 1,200-ton steam hopper barges, fitted with twin-screw triple-expansion engines and boilers, from the Mersey Docks and Harbour Board.

Messrs. Wm. Denny & Bros., of Dumbarton, have contracted to build for the Union Steamship Co., Limited, of New Zealand, a high-class steamer to be employed in their New Zealand passenger service. As in the case of all the other recent additions to this fleet, the new vessel is to be classed exclusively with the British Corporation registry. They have also contracted to build, for the British India Steam Navigation Co., a steamer of 5,300 tons.

Messrs. The Caledon Shipbuilding and Engineering Co., Limited, of Dundee and London, have lately booked a further order with the Clyde Shipping Co., Limited, which will make the 15th vessel built by them for the same company. The vessel is to be a high-speed passenger and cargo steamer of the following dimensions:—260 ft. by 33 ft. 6 in. by 16 ft. 4 in., and about 1,200 tons gross. She will have four powerful steam cranes, two steam winches, also steam steering gear, and other equipments of the latest type. Accommodation will be provided for about 90 first-class passengers. Her engines will be of the triple-expansion type, having cylinders, 25 in., 40 in. and 65in. by 48 in. stroke, working at 160 lbs. pressure, and a separate boiler for supplying steam for the cranes and winches.

Messrs. The Grangemouth Dockyard Co., Grangemouth, have received an order to build a steamer for Mr. F. le Boulanger, shipowner, Swansea.

Messrs. J. M'Arthur & Co., Paisley, have contracted to build a steel steamer of about 350 tons gross for Indian owners. She is intended for coasting purposes.

Messrs. Murdoch & Murray, shipbuilders, Port-Glasgow, have contracted to build a twin steel screw-steamer for passenger and cargo service on the river Amazon, similar in dimensions to previous steamers built by them for the Amazon traffic. Messrs. Lees, Anderson & Co., Glasgow, will supply two sets of compound engines.

Messrs. Charles Connell & Co., Whiteinch, have contracted to build for Liverpool owners, a large screw-steamer over 400 ft. long.

Messrs. Carmichael, M'Lean & Co., Greenock, have contracted to build for English owners four steel-screw steamers, each 140 ft. in length, to be engaged in the fish-carrying trade and to steam 12½ knots. They have also received an order from Messrs. T. Albert, Crompton & Co., London, to build two 100-ton steel lighters for service on the river Volga, Russia.

Messrs. R. Napier & Sons, Glasgow, have received an order from Messrs. Deves & G. Chaumet, of Bordeaux, to build a steamer of 2,000 tons deadweight. She is to have a speed of 11 knots.

Messrs. Paul Jones & Son, Gourock, have contracted to build a 65 ft. Daimler motor launch for an English gentleman.

Messrs. Stephen & Sons, Linthouse, have contracted to build a steel steamer of about 5,300 tons for the British India Steam Navigation Co.

Messrs. Caird & Co., Greenock, have contracted to build two steel twin-screw steamers, each 300 ft. in length, for the carrying of cargo and with moderate passenger accommodation, for the P. & O. Co.

Messrs. Scott & Sons, Bowling, have secured an order to build for Mr. W. Robertson, Glasgow, a steel steamer of about 750 tons, to carry about 1,000 tons deadweight.

The well-known river steamer *Athole*, which has been laid up at Bowling for some time past, has been purchased by Captain John Williamson.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—So far as the shipbuilding industry is concerned, matters continue in a state of quietude, very few new orders being heard of, and no signs being observable of a recurrence of the strong demand for tonnage which existed during the last quarter of last year. That the demand during the period referred to was somewhat overstrained there is no doubt, for many of the orders then placed have been cancelled, and others have been transferred. The reaction may, of course, have been brought about by the troubles in the east of Europe filling the public mind with fears of a general upheaval that would disorganize commercial affairs in all countries. This is one way of

solving the problem, and it seems to possess a considerable amount of reason; but for our part we incline to the opinion that the situation has been more directly influenced by fears of industrial disturbance at home. Last month, at this time, a great conflict between the employers in the engineering trade and that important section of the operatives who claim affinity with the Amalgamated Engineers' Society, seemed imminent; but a truce has been declared, and the storm may not now burst, after all, unless some further complication arises, which may force the hands of either the employers or the operatives. This state of matters has been brought about by the distinct refusal of the employers to admit of any interference in the management of their works by any outside party whatever. The trade unions had become so aggressive and dictatorial that among the general public some doubt existed as to whether or not the employers had control of the works. So far as regards the engineering employers, this doubt has now been dispelled, for they have declared their determination to claim the control, and to keep it under all circumstances and at any cost. If the recent conference between the representatives of the masters and the men in London had no other result than this, it is certainly a matter for congratulation that it was held, as the principle that has been affirmed will doubtless have a strong significance for employers in other trades, so that they may be nerved to follow the fine example set them, and refuse to permit further encroachments by the trade unions.

The declaration of the engineering employers to recognise no interference by outsiders in the management of their works has, indeed, already produced a good effect in the kindred industry of shipbuilding. It will be remembered that a very bitter dispute had existed between the caulkers and drillers on the Tyne and elsewhere, as regards the apportionment of certain work to which both sections had set up claims. The right of the employers to decide as to who should do the work, for which they would be expected to pay, was entirely ignored in this matter, and it was referred to the adjudication of an arbitration board. The decision of this tribunal, however, was unpalatable to one of the parties affected, and was consequently disapproved and repudiated. A patched-up settlement was, however, subsequently arrived at; but it was plainly stated that the settlement was only temporary, and that an attempt would be made to apportion the work differently to the apportionment of the arbitration board, as soon as opportunity offered. In other words, it was intimated that one of the parties would, in their own good time, take whatever their minds inclined to, without any regard to the employers' wishes or the other parties' claims. This was a state of affairs which might well cause apprehension in the public mind; for it seemed that the shipbuilding trade was going to be involved in a great dispute as well as the engineering trade. Now, however, the announcement has been made that, as the result of prolonged negotiations between the rival claimants, the settlement of this demarcation question has been left to the employers. This, of course, is as it should be, and most people will agree that it never should have been out of the hands of the employers; but it is something that in these days a trade society of such pretensions as the Boilermakers' should acknowledge that the employers are the right parties to settle a dispute of this description, and give the work to whom they chose. We are getting back to first principles rapidly, and if we go on at this rate we shall soon come within measurable distance of the time when every individual may do whatever honest work he is able to do, without let or hindrance from anyone.

At the Elswick yard of Messrs. Armstrong, Whitworth & Co. exceptional briskness continues to exist in the outside departments, as well as at the frame furnaces and adjusting sheds. The deliveries of steel plates and other kinds of constructive material have been very heavy for some weeks past; but as the consignments are being steadily absorbed by the work going on, no excessive accumulation is likely to arise, and there is nothing to prevent the deliveries being kept up at the same rate as hitherto during the remaining months of the year. Very considerable extensions are being made in the shipyard as well as in other parts of the works, and there is reason to expect that in a little time the productive capacity of the establishment will be substantially increased.

At the company's Low Walker yard the briskness noted in former reports is well maintained, and the same remark applies to other shipbuilding yards in the immediate neighbourhood.

Messrs. Wigham Richardson & Co. have their building berths well filled, and are reported to have recently received an order for a large steamer from a Hamburg company for whom they have previously built several ships of a superior class. It is also stated that the firm have been commissioned to build a steamer of somewhat small dimensions, but good running power, by a trading company in the south of Ireland.

Messrs. Hawthorn, Leslie & Co. have received an order for ten small steamers, to be employed in the passenger and cargo trades on a Siberian river. It is probable that the boats will not be completed here, but will be conveyed in sections to the destination of their permanent service, and there put together for rivetting and final completion. It is understood that another firm on the river have six or seven vessels of the same type to supply. Messrs. H. & L. are, we understand, building two superior type vessels for Norwegian owners.

The construction of the pontoon dock at Messrs. C. S. Swan & Hunter's yard, Wallsend, is being pushed on with extraordinary quickness, and the firm will soon be in a position to proceed with the building of another pontoon, should they have such an order on their books. The berths of the shipbuilding yard are fully occupied with vessels of a special class, and there are several boats on the river being fitted out. In the initiatory departments activity is still noticeable, which circumstance speaks well for the immediate future.

The Palmer Co. are getting through their Admiralty contracts with commendable celerity, and will soon have another torpedo destroyer and a cruiser ready for delivery. The success of this world-famous shipbuilding firm in Government work is most gratifying, every vessel they supply furnishing an additional proof of the great care and skill exhibited in both designing and construction. We are pleased to note that the firm have also a good supply of mercantile orders, and that their establishments on both sides of the Tyne will be kept busy during the whole of this year.

The Tyne Shipbuilding Co. launched, on the 15th inst., a fine steamer of nearly 6,000 tons carrying capacity, for Messrs. William Milburn & Co., of Newcastle and London. There are still on the stocks, in rather advanced stages, two other vessels of simliar dimensions, and it is understood that the initiatory work of another is being proceeded with. The yards of Messrs. Wood & Skinner and Messrs. Dobson are fairly busy, and it is understood that both firms have recently made some small additions to their order list. Messrs. Readhead are, as usual, well supplied with work, all the berths being occupied, and the frame-turning department continuing in full briskness. The firm received, a few weeks ago, an order for a 5,000-ton boat from Messrs. Hain & Sons, of St. Ives, for whom they have previously built considerably over a score of vessels. It would not be easy to find another instance where a firm of owners so persistently kept to one firm of builders over a great number of years, and it seems to us that the circumstance in this case is highly creditable to both builder and owner, but particularly to the former. The demand for small craft for fishing purposes keeps pretty good, and several orders for boats of from 150 to 200 tons, capacity have lately been placed with builders at North and South Shields. In the repairing establishments business is, on the whole, pretty good, and most of the graving docks are occupied with vessels undergoing overhaul. The slipways are also fully engaged, and the pontoon docks of the Wallsend Pontoons and Dry Docks Co., Limited, are rarely without an occupant.

Engineering.—Much interest has been aroused by the performances on her experimental trials of the turbine propelled boat *Turbinia*. The vessel is of exceptionally small dimensions, and is probably meant to be utilised only for testing the value of the turbine principle in marine propulsion. This purpose she has already fulfilled admirably, having, without vibration, and in a not too gentle sea, attained the remarkable speed of 32¾ knots per hour. This is but the beginning of a new departure in ship propulsion, which will, in all probability, have a far-reaching effect on the future of marine engineering, and it will be well for those interested in shipping to keep a look out for developments.

The Wallsend Slipway and Engineering Co., Limited, have just now some exceptionally large repair contracts in hand, among which may be mentioned the putting of new boilers in the s.s. *Orient*, and converting her engines from the compound to the triple-expansion type. By the change contemplated, the power of the engines is expected to be very largely increased.

The North-Eastern Marine Engineering Co., Limited, fitted the machinery of the fine steamer *Ashanti* early in the month, and she had a successful trial on the 8th. The vessel was built

by Messrs. C. S. Swan & Hunter, Wallsend, to the order of Messrs. Elder, Dempster & Co., of Liverpool, and is, we understand, intended for the cattle trade. The Neptune Engine Works, Low Walker, are extremely busy, and the same may be said of the Palmer Co.'s works, Jarrow, and the St. Peter's works of Messrs. Hawthorn, Leslie & Co.

Messrs. Noble & Lund, of the Northern Machine Tool Works, Felling, having completed their work of extension, are now engaged in putting down electrical plant for lighting and for power transmission purposes. The plant is to be of a quite up-to-date description, and will be complete in every detail. The firm are very well off indeed for orders, their piston packing rings (Mudd's Patent) being more than ever popular, and the demand for their other specialities being also greatly increased.

Messrs. Carrick & Wardale, Redheugh Engine Works, are experiencing a stimulated demand for their well-known types of ships' pumps, and the department of the works in which these specialities are manufactured, are being kept exceedingly busy.

The various departments of Messrs. Clark, Chapman & Co.'s works are fully employed, and supplemental operations are being carried on at the old works known as Black & Hawthorn's, which some time ago came into the firm's possession. Mr. Joseph Bailes, who for some thirty years was connected with the last-named firm, holding for a large part of the time the responsible position of manager, has started business on his own account at 27, Oxford Terrace, Gateshead, as a machinery merchant and general commission agent. Among the firms whose local representation he has taken up are Messrs. Bagnall, engineers, Castle Engine Works, Stafford; Messrs. Evans & Widowfield, Cardiff; and Messrs. Caddy & Co., Nottingham.

Messrs. S. T. Taylor & Sons, the well-known boiler and steam pipe coverers, of Scotswood-on-Tyne, have received the order for the non-conducting covering required in connection with the machinery of the two large torpedo destroyers, *Violet* and *Sylvia*, which Messrs. Doxford, of Sunderland, are building for the Admiralty. This is no undeserved honour, as Messrs. Taylor's work in this particular line has invariably given satisfaction to customers. The firm have also obtained the order for the covering required in the s.s. *Clan Macdonald* and the other large "turret" ships which Messrs. Doxford are building for the owners of the Clan Line. The firm have, in addition to the foregoing, received an order to cover the boilers and steam pipes of the Carron Co.'s new steamer *Avon*, which has been built and engined by Messrs. Wigham Richardson & Co., Low Walker. This is the second vessel belonging to the Carron Co. in connection with the equipment of which the firm have had a covering contract.

THE WEAR.

Shipbuilding.—Messrs. J. L. Thompson & Sons have launched four vessels this year (three within the present month), and are certain to attain an exceptionally large output in the twelve months if work is continued with ordinary regularity, or, in other words, if no interruption is caused by labour disputes. Two of the vessels that were launched have been for Greek and Austrian owners respectively, and one or two large vessels now on the stocks are for Japanese owners.

The Sunderland Shipbuilding Co., Limited, have commenced the construction of a large steamer for London owners, and have just launched two vessels ordered by German owners. The firm have other work of a special kind in hand, and are busier than they have been for some time past. The other yard at the South Dock (Messrs. Bartram & Sons) is being kept steadily employed.

Messrs. R. Thompson & Sons have three large vessels on the stocks, and have recently booked an order for another.

Messrs. Priestman & Co. have also booked an order lately, and have their berths now fully occupied.

Messrs. Short Brothers are still exceedingly busy, and at Messrs. Doxford's yard no falling off from the briskness of the past eighteen months is apparent. Messrs. Pickersgill, and Messrs. Osborn & Graham, have but little work in hand, and the outlook has not improved since last month. Briskness continues to be the feature at the yards of Sir James Laing & Sons.

Engineering.—The Palmer's Hill Works (Messrs. John Dickinson & Sons, Limited) continue to show great activity in every department, and night work is maintained wherever possible. The demand for Dickinson's patent crank shaft is well maintained, and the output of this speciality is steadily increasing.

The Southwick Engine Works are kept in very active operation, and the same may be said of Messrs. Doxford's works, and the North Eastern works, South Dock.

Messrs. John Lynn & Co. are rapidly increasing the scope of their operations in the supplemental works recently acquired by them. The ironfounding department is now in full swing, and new machinery is being put down to further develop the work of constructive engineering.

The works of the Sunderland Forge and Engineering Co., Limited, are well employed, and in the electrical department new orders have been booked. The Monkwearmouth Iron Works are now going full time, and the Monk Street Foundry and Copper Works continue so busy as to necessitate the working of overtime. In the smaller shops business is fairly active.

The Hartlepools.—The shipbuilding yard of Messrs. R. Irvine & Co., which has stood idle since the autumn of last year, is now about to be re-opened, and the workmen who formerly were employed there and are still resident in the locality, have been requested to hold themselves in readiness to recommence work at an early date. The extensions to the yard and the graving dock are not yet completed; but are so far advanced as to be practically so. It is understood that the firm have orders for one or two vessels, and that a commencement will be made with the building of them as soon as the frame material is received, and one or two matters of detail in connection with the plant and machinery are put in order. The other yards at this centre remain quite busy, and at the engineering works of Messrs. Thos. Richardson & Sons the condition of activity noted in previous reports is unchanged. The steel works are kept briskly going, but at the docks business is rather dull. A change will soon be noticeable, however, when the timber import season opens in good earnest.

Stockton.—Messrs. Richardson, Duck & Co. have a fair amount of work on the stocks, and have lately added to the work on their books an order for a steamer of 4,000 tons carrying capacity. The firm are also reported to have booked an order for a steamer of considerably larger capacity than the above-mentioned, from Liverpool owners. Both Messrs. Craig, Taylor & Co., and Messrs. Ropner & Sons, are also reported to have booked orders, and the outlook at this centre is fairly prosperous. Engineering works continue busy, the establishment of Messrs. Blair & Co. being particularly brisk. The rolling mills of the Stockton Malleable Co. continue in full operation, orders for ship plates and angles being still tolerably plentiful.

Middlesbro'.—The shipbuilding yards at this centre maintain an appearance of considerable briskness, and the principal firms are credited with the receipt of recent orders.

Messrs. Westgarth & English have just booked an order to supply the machinery of a small vessel about to be built by Messrs. R. Thompson & Sons, Sunderland. At other engineering works business continues satisfactory.

Darlington.—The works of the Darlington Forge Co. continue to be fully employed, but new orders are not plentiful, and a temporary slackness may be experienced later on. It is certain, however, that this well-known establishment will get its share of such orders as may be in the market, as its facilities for turning out work economically and quickly are quite exceptional.

THE MERSEY.

(From our own Correspondent.)

ALTHOUGH the threatening outlook abroad and labour troubles at home necessarily have a disturbing effect upon industrial prospects, there is no really material change to notice in the general position of the shipbuilding and engineering trades of this district. The shipyards on the Mersey are well engaged on orders in hand, marine engineers continue actively employed, and general engineering establishments are also as a rule kept fully going, many of the local firms having orders on their books to carry them forward for some time to come. Machine tool makers are exceedingly busy in all departments, especially on tools required for marine purposes, with new work coming forward steadily; boiler-makers are also well engaged, and locomotive builders continue full of work. In fact, the only branch of engineering in which any slackness is reported is the textile machine-making trade, and this, as previously reported, is due to various special circumstances.

The usual monthly returns of the principal trades union societies connected with the engineering trades show an increase

in the number of out-of-work members on the books, but this is due entirely to disputes in various important engineering centres, notably the Oldham district, and does not indicate any falling off in trade. The Amalgamated Society of Engineers has now 3¾ per cent. of its total membership on donation, but in the Manchester district there are only 2¼ per cent. on benefit, and these are nearly all thrown on the books as a result of the temporary depression in the textile machine-making industries. The Steam Engine Makers' Society has just under 1 per cent. of its membership on donation, which, notwithstanding fresh disputes that have arisen, is but a very slight increase on last month's return. The reports as to the state of trade continue of a most favourable character, and it is exceptional where anything like slackness is reported, practically all departments of marine and general engineering industry reporting activity to be fully maintained, the only disturbing element being the serious labour disputes in the north, which so far have not been settled.

Messrs. Laird Bros., of Birkenhead, have during the month launched from their yard a submarine mining vessel, which they have built to the order of the Argentine Government, and which will be completed at an early date. The *Munster*, one of the new mail boats for the City of Dublin Co., has passed through a very successful trial trip from Holyhead to Kingstown, and this, like the two previously tested, gave the full contract speed of 23 knots an hour, whilst the trip was in every other respect very satisfactory, fully maintaining the high standard of the boats previously tried. With regard to the construction of the *Munster*, it may be added that it differs in no respect from that of the *Ulster* and *Leinster*.

A very important move has been made during the past month by the leading engineering firms in the Manchester district by the formation of a strong federation to co-operate with the large employers in the north of England on all questions affecting labour and wages matters, the chief reason that has brought about this course of action being the serious demands which have been put forward recently by the Amalgamated Society of Engineers with regard to the employment of skilled labour on automatic machine tools. In this district the lead has been taken by the large firms engaged upon marine engineering work, special marine tools, and heavy engineering, and the association is practically the outcome of the special meetings convened towards the close of last year in connection with the demand by the men for a 2s. advance in wages, and which engineering firms in the district, whether members of the Iron Trades Employers' Association or not, were invited to attend. Hitherto the Manchester branch of the above association has been practically the headquarters of the employers' organization in the district, but it has not always been able to secure the united and energetic action on labour and wages questions which many of the leading firms have thought desirable. Special efforts have therefore been put forward with a view of strengthening the combination of employers in the district, and forming a new association which should be in a position to act more vigorously as occasion may arise, than has been found possible in the past. This new organization has been styled the Manchester District Engineering Trades Employers' Association, and is federated with the Employers' Federation of Engineering Associations. The association includes not only members of the Manchester branch of the Iron Trades Employers' Association, but also many large employers who had previously stood aloof, and there are at its head several well-known names in connection with the engineering trades that are sufficient guarantee that the new association will not be wanting in an energetic policy upon matters affecting the employers' interests that may from time to time arise.

With regard to the engineering dispute in the north, it is not at all improbable that some rupture may be caused between the Amalgamated Society of Engineers and the Machine Workers' Society, whose headquarters are in Manchester. The above dispute now chiefly hinges upon the class of labour to be employed on machine tools, and Mr. Arrandale, secretary of the Machine Workers' Society, addressed a letter to the Employers' Federation, in which he claimed that his society had a right to be consulted in any arrangement come to on the matter. This letter has called forth some strong expressions of opinion from the secretary of the Amalgamated Society of Engineers, and evidently his society consider that they are the only organization that has any right to be consulted with regard to any settlement that may be arrived at. Employers in this district, however, think that Mr. Arrandale has very properly intervened, and that the question practically affects his society more than any other, and it would seem incomprehensible that, in discussing the matter from the workmen's standpoint, the Machine Workers' Society should not be recognised as being at any rate on an equal footing with the Amalgamated Society of Engineers.

Sir W. G. Armstrong, Whitworth & Co. are exceedingly busy at their Manchester works in all departments. In the tool department they are making more tools, both on home and foreign accounts, than have ever been turned out at the works before. These include a large order for special tools for Russia, and they have just delivered three exceptionally powerful lathes for Germany. In the ordnance department the company is also very busy. Two sets of gun mountings have just been sent out for the *Cæsar*, now being completed at Portsmouth, and two further sets are being finished for another British battleship that is being built at Chatham. The company have also received orders for their improved mountings, to be supplied to three battleships of the *Canopus* class, and which are to be completed early next year. These mountings are so constructed that the revolving turret carries with it a full supply of ammunition, so that the guns can be re-loaded in any position without being brought back to the loading point, which is requisite with gun-mountings of the present description, and the new arrangement materially increases the facility for quick-firing. The whole of the above mountings are for the 12 in. wire guns, and of these the company are constructing ten, most of which are nearly completed. It is also worthy of note, in connection with the gun-mountings which the company have in hand for English battleships, that almost every detail where steel is used is forged, even including all the brake cylinders, which are forged out of solid lumps. This system of construction affords the greatest possible resistance to the enormous shock and strain which is experienced throughout the mountings when the gun is fired, and considering that most continental powers use steel castings only, this superiority in the construction of British warships is an important feature. The company had in hand at the time of our visit a number of special steel castings in stem and stern pieces for several of the battleships now building, which were very awkward pieces to produce, each weighing about 27 tons. In the marine engineering department the firm are exceedingly busy on high-class work in hollow shaftings and forgings, both for battleships at home and abroad, and for commercial requirements, including the whole of the shafting for the large new Transatlantic passenger ship now being built by Messrs. Harland & Wolff.

Messrs. Hulse & Co., Ordsal Works, Salford, have just completed for a shipbuilding yard in the north of England a very large combined horizontal and vertical planing machine, entirely self-contained, and capable of planing 20 ft. horizontally, 16 ft. vertically, and 2 ft. 6 in. transversely. The base-plate for carrying the work stands forward of the machine some 8 ft., and is very massive, being 2 ft. in depth. The cross slides are strongly framed together, and supported upon three uprights, which are in turn firmly bolted to the baseplate. The feed motions, both horizontal and vertical, are graduated from one-sixteenth to half an inch. In other departments of their works the firm are also exceedingly busy upon important orders for specially-designed marine engineering tools. Amongst other work, they have in hand several complete plants specially designed for dealing with the various portions of the Belleville boilers and economisers, a large number of milling machines, mostly of their patent vertical type (now so well known), together with several of the planing-machine type, one of which is a very powerful machine with two vertical spindles, on the cross-slide, capable of dealing with lengths up to 10 ft. and widths up to 6 ft. The firm are also very busy in their patent twin-screw lathes, of which they have quite a number on hand, four being of an exceptionally large type; and one of these, for dealing with heavy steel forgings for ordnance and marine work, is little short of 100 ft. in length, and when finished will weigh about 150 tons. They have also in hand a couple of large milling machines of the planing machine type, with horizontal spindles, of a similar type to what they have previously made for locomotive boilers, but these machines have been specially designed for marine engineering requirements. Smaller tools include a number of lathes, with 10 up to 4 in. height of centres, specially arranged for tapering, turning, and boring work, with a variety of general engineering tools, and the firm are just sending away for Japan a large planing machine with screw-traversed table, and four tool boxes for arsenal work, and also a large duplex-face lathe

for similar requirements, ordered by the Japanese Government. Other foreign work includes orders for India, New Zealand, Burmah, and other parts of the world.

Messrs. James Spencer & Co., Hollinwood, are busy completing orders for Japan, including a general assortment of tools for the equipment of the torpedo ship and gun-carriage department, and a substantial line of 150 screw-cutting lathes in three sizes. They have also a good deal of work in locomotive tools, both for home railways and for India, and are very busy in their travelling crane department, which has recently been largely extended.

Considerable extensions are being carried out at Messrs. Crossley Bros. Works, Openshaw, including a new special department for the manufacture of oil engines.

The position in the iron trade here continues very unsatisfactory, business being extremely slow, with a weak tone as regards prices. The unsettled labour outlook and the outbreak of war in the East necessarily have a disorganising effect upon the market, and the uncertainty as to the future causes buyers to refrain from placing orders except for the merest hand to mouth requirements. Makers prices are still for the most part nominally about as last quoted, but they are booking little or no business, whilst merchants although prepared to take considerably under makers quotations, are not securing orders of any moment. Local and district brands of pig-iron show no appreciable change; makers still ask about 46s. 6d. for forge to 48s. 6d. for foundry, Lancashire, less 2½; 44s. for forge to 45s. 6d. for foundry Lincolnshire, and 48s. to 49s. for foundry Derbyshire, net. cash, delivered Manchester; but there is very little enquiry stirring, and merchants are underselling. In outside brands, there has been a decided giving way so far as prices in the open market are concerned. Foundry Middlesbrough could be bought at about 47s. 4d. net, delivered by rail Manchester, with Eglinton and Glengarnock obtainable as low as 48s. 3d. net, delivered Manchester Docks, although makers' quotations are considerably above these figures.

In the finished iron trade prices have also shown a weakening tendency, especially in bars and sheets. Makers' still quote about £5 17s. 6d. for Lancashire, and £6 2s. 6d. to £6 5s. for North Staffordshire bars, delivered Manchester district, but they are unable to secure new business on this basis, merchants, in some cases, offering at quite 1s. 6d. per ton less. Sheets have eased down considerably, and do not now average more than £7 to £7 2s. 6d. Hoops, however, are steady at the Association list rates of £6 10s. for random, to £6 15s. for special cut lengths, delivered Manchester district, with 2s. 6d. less for shipment.

The steel trade has also been anything but brisk, although there have been a few fair orders placed in manufactured goods for structural requirements. Prices, although without material change, are weaker, if anything. Ordinary foundry hematites are now obtainable at 58s. 6d. to 59s., less 2½; local billets, £4 10s. net.; bars, £6 2s. 6d. to £6 5s., and boiler plates, £6 5s. to £6 7s. 6d. delivered at Manchester district.

An active demand continues to be reported in the metal market, and manufacturers are kept exceedingly busy, but the drop in copper has been followed by a giving way in list rates for some classes of manufactured goods, copper wire, brass wire, rolled brass and brazed brass goods having been reduced ¼d. per lb. Locomotive condenser-tubes have, however, not shared in this reduction, owing to the exceptionally good demand for this class of goods, and other descriptions of manufactured metal remain unchanged. List rates, delivered Manchester district are now as under:—Solid-drawn brass boiler tubes, 7½d.; brass-surface condenser tubes, 8¾d.; copper tubes, 8¾d.; brazed copper, gas and steam tubes, 8½d.; brazed brass gas tube, 7¾d.; brass wire 6½d.; copper wire, 7½d.; rolled brass, 6d.; sheet brass 7¾d. per lb. Prices with the close of the month show an exceedingly firm tone, and list rates are fully maintained.

In the timber trade there has been very little activity during the past month, but deliveries have been fairly satisfactory, and prices are without material alteration. Imports of most articles have been about an average, and stocks generally, although not too heavy, are sufficient for the time of the year. The arrivals of East India teak have been moderate, and, with a steady demand coming forward, there is no great weight of stock, and prices, especially for planks, have shown an upward tendency. A cargo of greenheart has arrived, and, with stocks ample, prices are easier.

The coal trade shows no appreciable change. The holiday stoppages of the pits have in many cases caused an accumulation of orders, which are keeping pits fully going, with here and there stocks filled up to meet requirements; and this is tending to give a fairly steady tone to the market for the time being. House coals are in fair demand, the cold weather, no doubt, bringing forward rather more orders than usual at this time of the year, and prices are fairly well maintained. Steam and forge coals move off pretty readily, but are not more than steady, at recent-quoted rates. At the pits' mouth best Wigan Arley averages 10s. to 10s. 6d.; Pemberton four-foot and Seconds Arley, 8s. to 8s. 6d.; and common house coal, 6s. 6d. to 7s. per ton, with ordinary descriptions for steam and forge purposes obtainable at about 5s. 9d. to 6s. 3d. per ton. During the past month one or two small contracts for gas coal have been placed, and it is reported that the prices at which they have been secured represent slight advances upon last year's rates. With respect to the contracts for locomotive fuel, it is stated that one of the large companies is making a determined effort to force down prices even below last year's rates; but whether this attempt will be successful remains to be seen. Engine fuel is in good demand, and with supplies none too plentiful prices show a tendency to harden, but generally 3s. to 3s. 6d. remains the average for common slack, with better sorts ranging from 4s. 3d. to 4s. 9d. at the pit.

In the shipping trade there has been a fairly active demand, but only at low figures, ordinary descriptions of steam coal, delivered Mersey ports, only in exceptional cases fetching more than 7s. 6d. to 7s. 9d. per ton.

BELFAST TRADE NOTES.

(From our own Correspondent.)

THE Easter holidays here caused a cessation of work generally for the greater part of a week, but owing to the very busy state of trade in the engineering and shipbuilding works, notices were put up for work to commence again on Wednesday morning, 21st inst. The response to the notices, however, was poor, very few of the men have started work.

It is reported on good authority that orders have been placed during the month with local shipbuilders for some exceptionally large steamers.

The s.s. *Pennsylvania*, of Hamburg, recently built here, has just completed her maiden voyage from New York to Hamburg. Her owners are so well satisfied with her performance during her first voyage that they have ordered one duplicate, if not two, from the same builders (Messrs. Harland & Wolff). At the present time this firm are extending and re-arranging their launching slips in both ends of building yard. This work has caused a good deal of delay to the ironworkers lately, but the material is now coming rapidly to hand, and this yard will be able to show its capabilities before the end of the present year. Let us hope that trade disputes of any shape or form may not come nigh our island.

During the present month the s.s. *Arcadia*, built by Messrs. Harland & Wolff, Limited, for the Hamburg-American Steam Packet Co., a sister ship of the *Arabia*, which left Belfast lately, proceeded, after trial and adjustment of compasses in Belfast Lough, to Hamburg, to load for her first voyage. The *Arcadia* is intended to run in the Company's North Atlantic trade, and is of the following dimensions:—Length, 400 ft.; breadth, 49 ft.; depth, 30 ft. 3 in. The gross tonnage of the ship is about 5,450, and she has been built to the highest class of Germanischer Lloyd's. She has accommodation for some first-class and about 300 steerage passengers, and is fitted with every mechanical facility for the rapid loading and discharging of cargo, as well as with refrigerating machinery of the most approved kind, and a complete installation of electric light. The propelling machinery has also been constructed in the builders' works, and consists of a set of quadruple-expansion engines, specially designed to avoid vibration. The saloon, state-rooms and other rooms have been suitably decorated and upholstered and finished in the builders' first-class style. The trial trip being a success, the vessel commenced her voyage under the command of Captain Martens.

The new twin-screw steamer *Gaika*, the seventh vessel built by Messrs. Harland & Wolff for the Union Steamship Co., left

her moorings on Thursday morning, the 15th inst., and proceeded down Belfast Lough for trial trip and adjustment of compasses. The length of the *Gaika* is 430 ft ; breadth, 52 ft. ; and depth, 33 ft. She is over 6,000 tons register and propelled by twin-screws driven by two sets of triple-expansion engines constructed by the builders. This steamer is the second of three new steamers Messrs. Harland & Wolff have in hand for the Union Co. of a similar type to the well-known "G's" also built by them and already running in the same service, but of considerably larger dimensions, and with unusually complete accommodation for first, second and third class passengers. The vessel is so arranged as to provide a very large carrying capacity for cargo on a light draught of water. The saloon is richly decorated and has every convenience for passenger accommodation. Complete installation of electric light and refrigerating apparatus with cold chambers for the conveyance of fruit are provided. In addition to another steamer, a duplicate of the *Gaika*, Messrs. Harland & Wolff have at present in hand a much larger ship for the Union Steamship Co., to be named the *Briton*, and which, when completed, will be the largest steamer in the South African trade. The *Gaika* left direct for Antwerp and will sail from Southampton on or about the 29th inst., under the command of Captain Bernard Copp.

The screw steamer *Belvidere*, recently completed by Messrs. Workman, Clark & Co., Limited, and owned by Messrs. R. & C. Allan, ran an official trip on the Clyde on April 17th. The dimensions of this steamer are :—Length, 255 ft. ; breadth, 34 ft. ; depth, moulded, 24 ft., and she has been constructed, both in hull and machinery, to the highest class of the British Corporation Registry. This vessel has been designed and built for the carriage of fruit from the West Indies to the United States. The 'tween decks and holds have been fitted up in the most improved style for the storage and carriage of fruit. The engines are of the triple-expansion type, working at a pressure of 190 lbs., fitted with Howden's arrangement of forced draught. The trial trip being in every way satisfactory, a speed of 15¾ knots being obtained, the vessel proceeded on her voyage to the West Indies to load her first cargo of fruit.

On Saturday April 17th, a large steamer, built to the order of the Cunard Co., was launched from the south yard of Messrs. Workman, Clark & Co.'s building works. The *Gyria*, as the new Cunarder is named, will have a carrying capacity of 5,000 tons, and will be engaged in the company's Mediterranean trade. She is the second of three steamers built by Messrs. Workman, Clark & Co. for the Cunard Co.

Messrs. Mc.Coll & Co., Limited, have, we understand, received an order from Messrs. Alex. King & Co., coal merchants, Belfast, for a new steamer for coal carrying trade. This firm are busy completing the harbour tug, *Musgrave*, which will shortly be ready for service.

Messrs. Victor Coates & Co., Limited, are at present constructing several sets of their well-known triple-expansion type of engine and are fully employed just now.

As an evidence of the increasing prosperity of Belfast, several of the cross-channel steamers are now of much larger dimensions, consequently they require more quayage room, and at present the powers of the Belfast Harbour Commissioners are being taxed to their utmost in order to find the required accommodation.

NORTH-WEST OF ENGLAND.

(*From our own Correspondent.*)

Barrow-in-Furness.—A quieter time seems to have settled on the shipbuilding and marine engineering trades of the North-West of England. So far as Barrow, the chief centre of the trade, is concerned, there are undoubtedly two or three reasons for this. In the first place, Barrow builders experience, in common with other builders, at present a scarcity of orders generally, the demand for new tonnage being very small, and the competition for the few orders offering very keen. In the second place, the Barrow works are in a transitory state by reason of the fact that they are being taken over at the end of June next by Messrs. Vickers, Sons & Co., Limited ; but as a matter of fact this ought not to preclude the possibility of getting new orders, as the undertaking of the Naval Construction and Armaments Co. was taken over by the eminent Sheffield firm from July 1st last. The new owners are paying the shareholders of the Naval Construction and Armaments Co. 5 per cent. on the current year's working, and will consequently take over any profit that may arise at the end of June when the financial year ends. But as Messrs. Vickers' shareholders have only recently approved of the purchase of the Barrow Works, and as the meeting of the shareholders of the Naval Construction and Armaments Co. has not yet been held to determine on the sale of their property, although the meeting has been fixed for May 4th in London, and although it is a foregone conclusion that the requisite approval will be forthcoming, as those who negotiated the business have the commanding influence in the large number of shares they hold, some reason may be found for the absence of any activity on the part of Messrs. Vickers in the matter of securing orders for their new branch of business at Barrow. This inactivity is, however, more apparent than real, as it is known that Messrs. Vickers intend laying themselves out for a big trade in the building of warships of every type, and in equipping them with their own make of armour-plate and their own manufacture of guns, and that a programme of operations with this object in view is already being carefully considered and worked out. One of the directors of Messrs. Vickers is now away on a visit to Japan and China with a view to business, and as both these nations are in need of considerable additions to their navies, it is quite on the cards that orders are likely to come to Barrow and to Sheffield to a firm which can do all the work of building and full equipment by means of its own works. There is also reason to believe that the new firm will commence at an early date with the building of either a modern warship or a modern cruiser as a speculation, or perhaps both, as there is no doubt a good market will open for one or either before they could possibly be ready for delivery. There is the further fact to consider, that although at Barrow, one of the largest and fastest cruisers ever built was produced, although with several second-class and third-class cruisers, torpedo boats, torpedo-boat destroyers, and a variety of other Admiralty work in which the town has won marked success and popularity, it has never built a full line-of-battle ship, although quite willing and ready to do so. Its reputation in this respect has yet to be made, and Messrs. Vickers are quite alive to this fact, and are preparing to make the start at an early date. A significant fact as to the intentions of the new owners in the matter of gun manufacture is shown by the application they have made to the Board of Trade for powers to erect batteries for gun practice at Eskmeals, on the coast of Cumberland, a distance of 30 miles north from Barrow by rail, or about 20 miles as the crow flies. It was foreshadowed some time ago that the intention of Messrs. Vickers was to open out a department at their Barrow works, if not for the manufacture of guns from the beginning, at any rate to finish them at this place, and the effort to acquire a site on the Cumberland coast for testing and target practice gives some credence to the surmise. With the exception of the order to repair the Great Western steamer *Ibex*, which was damaged in the English Channel a week or two ago, no new orders have been placed at Barrow during the month. The work already in hand is proceeding very satisfactorily. The twin-screw steamer for the Great Western Co., the *Roebuck*, has received her engines and boilers, and is being rapidly pushed forward so as to receive early delivery and be ready for the opening of the season in the Channel islands service. The launch of the sister ship *Reindeer* is fixed for May 1st. Much attention is being directed at present to the trials and completion of the four torpedo-boat destroyers, *Avon*, *Otter*, *Bittern* and *Leopard*. An accident happened to the *Avon* when on one of her trials. When she was developing a speed of over 28 knots in the Morecambe Bay, she suddenly began to vibrate to an unusual extent, and on examination it was found that her port propeller bracket had broken, and the tail end of the shaft becoming bent with the high speed, her propeller smashed through the stern of the vessel and damaged the starboard propeller as well. The aft bulkheads were flooded, but it was soon found that otherwise the ship was quite taut, and she steamed back to Barrow by means of her starboard engine, and her repairs are now receiving attention. A new tail-end shaft is now being made by Messrs. Vickers. The *Otter* has had one or two satisfactory preliminary trials, and the other two torpedo-boat destroyers will soon be ready to undertake their trials. The first-class cruiser, *Niobe*, is being rapidly pushed forward with. Her engines are being built up in the shop, and the Belleville boilers are nearly ready to be lifted in. She will probably be finished ready for her trials by the autumn. Her sister ship, the *Amphitrite*, is the scene of much activity on the stocks, and already the work is well in progress in the building of the new Fleetwood and Belfast steamer, which is to be

called the *Duke of Cornwall*. The Manchester sludge boat is the only other work on hand, so that it will readily be seen that new orders at Barrow are needed to keep the big yard going.

West Cumberland.—Steady activity is observable in the ship-building trade of Workington and Maryport, and as work is completed new keels are laid.

The Hematite Trade.—The demand for hematite pig-iron is steady, although warrant prices have fluctuated somewhat during the month. Makers quote 50s. to 51s. for parcels of mixed Bessemer Nos., net f.o.b., and warrant iron is at 47s. 0½d. net cash sellers, 47s. buyers. Thirty-seven furnaces are in blast, as compared with 39 in the corresponding week of last year. Stocks of iron held in warrants have been reduced 19,000 tons since the beginning of the year, and now stand at 276,000 tons.

Shipping.—The shipping trade is fairly well employed. The aggregate shipments for the year from West Coast ports total up to 121,697 tons of pig-iron and 134,307 tons of steel, as compared with 96,681 tons of pig-iron and 131,249 tons of steel in the corresponding period of last year, an increase of 25,036 tons of pig-iron and 3,058 tons of steel.

Miscellaneous.

Marine Engineers' Examination.—At the examination held April 13th to 15th, Mr. Fred Paterson, of Sunderland, and Mr. G. L. Spencer, of Cardiff, succeeded in passing for Extra First-Class Engineer. Both passed the first time of going up, and make 38 successful pupils in this grade from the establishment of Mr. W. H. Thorn, 5, Waterville Terrace, North Shields.

Iron and Steel Institute.—The Annual Meeting of this Institute will be held at the Institution of Civil Engineers, Great George Street, Westminster, on Tuesday and Wednesday, May 11th and 12th, at 10.30 a.m. each day. The following is a list of Papers that are expected to be read and discussed. 1. "On the Permeability of Steel-Making Crucibles," by Professor J. O. Arnold and F. K. Knowles. 2. "On the Practice of the Combined Open-Hearth Process of Bertrand and Thiel," by E. Bertrand. 3. "On the Agricultural Value of Sulphate of Ammonia from Blast Furnaces," by F. J. R. Carulla. 4. "On the Specific Heat of Iron," by Professor W. N. Hartley, F.R.S. 5. "On Charging Open-hearth Furnaces by Machinery," by Jeremiah Head. 6. "On the 'Weardale' Reheating Furnace," by H. W. Hollis. 7. "On the Effect of Phosphorus on Cold Shortness," by Baron Hanns Juptner von Jonstorff. 8. "On the Determination of Hardening and Carbide Carbon," by Baron Hanns Juptner von Jonstorff. 9. "On Malleable Cast Iron." by G. P. Royston. 10. "On Carbon Changes connected with malleable Cast Iron," by G. P. Royston. 11. "On Microscope accessories for Metallographers," by J. E. Stead, member of Council. 12. "On Central Blast Cupolas," by T. D. West. The annual dinner of the Institute will take place on May 11th in the Grand Hall of the Hotel Cecil, at which His Highness the Duke of Teck will be the guest of the evening.

The Electrical Industry in Cape Colony.—A report on the electrical and allied trades at the Cape is being prepared by Mr. A. P. Trotter in his capacity as honorary correspondent of the London Chamber of Commerce for Cape Colony, and he will allude in the report, among other matters, to the prospects of employment for electrical engineers in South Africa. In the course of a letter to the London Chamber, dated Cape Town, March 24th, Mr. Trotter says: "My object in writing now, is to ask you to make it known as widely as possible, through your journal and through the technical press, that no electrical engineers should come out to South Africa at present unless they have secured definite appointments before sailing. Electrical engineers experienced, and (apparently) otherwise, come to me almost as regularly as the mail, with and without introductions. I regret that I have not been able to give any assistance whatever. Engineers wanting assistants generally send home for them—a very satisfactory course for both parties. I have received letters from electrical engineers of some experience in the Transvaal, that, owing to the stagnation of trade, staffs are being reduced, and that many competent men are out of employment."

Brown's Marine Engineers' Pocket Log and Diary for 1897. Glasgow: Jas. Brown.—This little volume will prove very useful to sea-going engineers. There is a great deal of useful information, such as tide tables for British and foreign ports, a very complete distance table from the principal ports and also for the principal rivers and channels, as well as the mean distance tables of the ordinary trips of the great mail lines. A good deal of information as to matters which will prove especially useful on trial trips and at sea is afforded. Many weights and measures including such as wire gauges and weights of pipes, which are not included in ordinary almanacs will also be found here. Besides all this, which is perhaps of somewhat general interest, there is a great deal which will be especially attractive to those of our readers who are in active service. There are voyage tables and logs ready to be filled in by the user of the book, and there is much of value in the Standing Orders of Officers and those for Boat and Fire drill. Altogether the book shows that it has been compiled by practical men, and will be appreciated accordingly.

The Metric System. By W. H. Wagstaff. London: Whittaker & Co. 1896.

This little volume is a carefully worked-up case in favour of a change from our present British system of imperial weights and measures to the metric system which prevails on the Continent. There is no doubt a very strong case for the reformers. But in this question, as in most others, there are two sides, and those who resist change have their points too. We are rather inclined to treat this question in the same way as we treat the question "Made in Germany." In each of these matters no doubt there is some substantial ground upon which those who cry out for what they call reform can justify their clamour. Yet in each case there are those who are very much content with things as they find them. Take, for example, the engineering trade. Here we hear great complaints from some quarters as to the severity of German competition. Yet we could name prosperous firms of British engineers who say there is nothing in foreign competition. That when the foreigner can interfere with the speaker's trade it will be time that he was cleared out "Let the best man win," is the cry, and there is a decided confidence shown that the best man in this case is, and means to remain, the Englishman. Now in this metric business the matter is very much of the same kind. No doubt it would be a convenience to exporters if there were no difference between our weights and measures and those of our continental neighbours. But the fact is unfortunately patent that such difference exists. We know one firm which delights in the existence of the difference. They say that the little difficulty—call it confusion, if you will—all redounds to the advantage of the man who is not slothful in business.

Now this view is a little supported by a case quoted in the volume before us. There it appears that a timber dealer was obliged to give up his export trade because he could not get his men to measure timber here in foreign measure. The fact was annoying, no doubt, but was it really a sufficient reason to stop an energetic and pushing business man? The workmen were inexperienced and, possibly, a little stupid. We should all perhaps be the same under the circumstances. But instead of telling the men to make their quantities in foreign measure surely it would have been a simple thing indeed to work out the conversion of tables in the office, and simply tell the men to measure out so many running feet, and such a fraction of a foot as it was found would be the equivalent of the number of running metres ordered by the foreign firm. Thus, too, we are inclined to think that the argument that Manchester houses are penalised abroad if their conversion clerks make mistakes in their work is rather a hollow one. Clerks should not make mistakes, and if they do their employers will suffer whether the subject matter be weights and measures, or anything else, unless the system of the office is sufficient to find out the human error in proper course.

There is another side to the picture. The exporting houses are comparatively few. The people who use weights and measures are many. They comprise the whole population. The inconvenience and expense to which the small shopkeeper and his ignorant customer would be put by change would be very great. This fact should by no means be lost sight of. It is not a reason why change should not be made. But it is a very good reason why change should be considered with the greatest care, and should not be advocated unless there be shown an overwhelming case in its favour.

The book is well written, and the matter has been well studied and well advocated by the writer. It is certainly worth the consideration of the intelligent reader. But the points we have referred to should not be lost sight of in its consideration.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Scotland.—On March 17th Messrs. Cook, Welton & Gemmell launched at Hull an iron steam trawler of 150 tons gross, to be classed 100 A1. She is owned by the Hull Steam Fishing and Ice Co., Limited, and was named the *Scotland*.

Empress.—On March 22nd Messrs. Edwards Brothers launched at North Shields, for Mr. J. T. Crampton, the steam trawler *Empress*. She is 120 tons gross, and is to be classed 100 A1.

Teal.—On March 22nd Messrs. Edwards Brothers launched at North Shields, for Messrs. Kelsall Brothers & Co., the steam trawler *Teal*. She is of 144 tons gross, and will be classed 100 A1.

Solon.—On March 23rd Messrs. Cook, Welton & Gemmel launched at Hull, for the Standard Steam Fishing Co., Grimsby, the steam trawler *Solon*. She is 160 tons gross, and is to be classed 100 A1.

Sea King.—On March 23rd a steamer of 193 tons, named the *Sea King*, was launched at Beverley, and is owned by the Anchor Steam Fishing Co., Limited, of Grimsby.

Wreathier.—On Tuesday afternoon, March 30th, Messrs. Craig, Taylor, & Co. launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a very smart steel screw steamer of the following dimensions, viz.: 208 ft. by 31 ft. by 13 ft. 7 in., built to the highest class in Lloyd's, of the well-deck type, having poop, raised quarterdeck, bridge, and topgallant forecastle. She is fitted with water ballast in double cellular bottom, and in peaks. She has exceptionally large cubic capacity, and is fitted with self-trimming hatches; rigged as a fore and aft schooner, and equipped with three steam winches, steam steering gear, steam windlass, and large donkey boiler. The engines are being constructed by Messrs. MacColl & Pollock, of the Wreath Quay Engine Works, Sunderland, the cylinders being 17 in. by 28½ in., 46 in. by 30 in. stroke, with large boiler to work at 160 lbs. pressure. The vessel is built on very fine lines, and is estimated to give a speed of over 11 knots. She has been built to the order of Messrs. The Goole and West Riding Steam Shipping Co., Limited (H. W. Ezard, Esq., secretary), and under the superintendence of Mr. George H. Strong, M.I.N.A., consulting engineer of Hull, and also Captain C. Moore, who will take command of the vessel. As she left the way she was gracefully christened the *Wreathier* by Mrs. E. W. Hunter, wife of the chairman of the company, who was presented with a pretty bouquet by Master Vernon Taylor, son of one of the builders. Amongst those present were Mr. E. W. Hunter (chairman), Mr. H. W. Ezard (secretary), Mr. and Mrs. B. Brown, Mr. and Mrs. A. Blyth, Mrs. B. Parrish, Miss Wreathier Parrish, Mrs. P. and Master Farnill, Mr. and Mrs. J. Cottingham, Captain C. and Miss Moore, Master E. Buttle, and Mr. George H. Strong, M.I.N.A.

Arlington.—On Wednesday, March 31st, Messrs. Wm. Gray & Co., Limited, launched a handsome screw steamer which they have built for the Deddington Steamship Co., Limited, of Hull (Messrs. H. Sammon & Co., managers). Her principal dimensions are:—Length, over all, 336 ft., breadth, 47 ft.; and depth, 24 ft. 10 in., and her class will be the highest at Lloyd's. The deck erections consist of a full poop, bridge, and forecastle, and the rig is fore and aft schooner, with telescoping topmasts. Very tasteful cabin accommodation will be provided under the poop, consisting of saloon, state-room, and captain's and officers' rooms. The engineers' quarters are amidships and the crew's berths forward. The sides of the vessel are supported by strong web frames, taking the place of hold-beams as far as possible, and leaving a clear hold for stowing bulky goods. A cellular double bottom is fitted, and also an after-peak tank for water ballast, while the steam windlass, steam steering-gear amidships, screw gear aft, steam winches, patent donkey boiler, and the whole of the outfit, are of the most approved description. The machinery for the vessel will be supplied by the Central Marine Engine Works of William Gray & Co., Limited, the engines being of the triple-expansion type, with three inverted cylinders, 24 in., 38 in. and 64 in., and a piston stroke of 42 in., to receive steam from two large steel multitubular boilers working at a pressure of 170 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Walter Sage, of Hull, on behalf of the owners. The ceremony of naming her *Arlington* was gracefully performed by Miss Gibson, daughter of Mr. E. Gibson, manager to Messrs. H. Sammon & Co.

Hermod.—On March 31st there was launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay-on-Tyne, a handsome new steel screw steamer, which has been built to the order of Messrs. Bruusgaard, Kjosterud & Co., of Dram, Norway. The following are the principal dimensions of the vessel, viz.:—Length, over all, 248 ft.; breadth, 35 ft.; depth moulded, 20 ft. 6 in. She is of the single deck type, with bridge and topgallant forecastle, and will be rigged as a fore and aft schooner, and fitted with telescopic topmasts. The saloon, captain's accommodation, and spare berths are in a large house on the bridge deck amidships, with chart-room and flying bridge above, the officers' accommodation being in side houses on main deck, while the crew are berthed in topgallant forecastle. The vessel has been constructed to attain the highest class, viz., 1 A1*, Norwegian Veritas, on whose behalf she has been surveyed during the building by Mr. Lauritz M. Bodin, of Sunderland, the local representative, and is fitted with all the latest appliances and improvements for facilitating the rapid loading and discharging of cargo, and the working of the vessel generally, including combined steam and hand steering gear amidships, screw gear aft, direct acting steam windlass, powerful steam winches, multitubular auxiliary boiler, &c. Water ballast is provided in the cellular double bottom all fore and aft. The engines, which are of the improved triple-expansion type, having cylinders 18½ in., 30 in., and 49 in. diameter respectively, with a stroke of 33 in., supplied with steam by a large steel boiler working at 160 lbs. pressure, have been built and will be fitted by the North-Eastern Marine Engineering Co., Limited, at their Wallsend Works. The christening ceremony was performed by Miss Mary Wood, of Newcastle, who, as the vessel glided from the ways, named her the *Hermod*. Both the ship and engines have also been superintended during construction by Mr. Norman Burnett, of Newcastle, inspector for the owners. When completed the *Hermod* will be commanded by Captain N. T. Nielsen, of Sandefjord, Norway. This vessel is the second built by Messrs. Wood, Skinner & Co., while the firm have a third ship in course of construction on the stocks for the same owners.

King Frederick.—On March 31st Messrs. Short Brothers launched at Pallion, Sunderland, a handsomely-modelled steel screw steamer, built to the order of the King Line, Limited, of which Messrs. Philipps & Co., of London, are the managers. The dimensions are:—Length, 310 ft.; breadth, 44 ft., and depth moulded, 22 ft. 10 in. This vessel, which has been constructed under special survey to the highest class in Lloyd's Registry, has been specially designed for the carrying of a large cargo on a shallow draught of water. There are no obstructions in the holds, deep framing and side stringers being substituted for beams, thus leaving the holds perfectly clear. There are six cargo hatchways with a powerful steam winch at each, steam being supplied by a large donkey boiler. The vessel is constructed with a short full poop, long bridge-house amidships, and topgallant forecastle. The accommodation for captain, officers, and engineers is fitted in houses on the bridge deck, the saloon being handsomely fitted up in polished hardwoods. The steam steering gear is fitted at after end of the engine platform with controlling rods to wheelhouse on flying bridge, powerful screw gear being fitted on poop deck. The double bottom is constructed on the cellular principle, and is divided into trimming tanks for water ballast. The engines, which are of the triple-expansion type, are to be supplied by Messrs. Blair & Co., Limited, of Stockton-on-Tees, having cylinders 23 in., 37½ in., and 61½ in. diameter, with a stroke of 39 inches, steam being supplied by two large steel boilers having a working pressure of 180 lbs. per square inch. On leaving the ways the vessel was named the *King Frederick*, the ceremony being performed by Mrs. Rutherford, of Egerston Hall, Jedburgh. During construction the vessel and engines have been under the supervision of Mr. W. B. Cumming, of Liverpool, assisted by Mr. D. B. Cumming on behalf of the owners.

Martha.—On Thursday, April 1st, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 242 ft.; breadth, 34 ft.; depth, 18 ft. 10 in. She has been built to the order of Mr. Martin Carl, of Copenhagen, and will take Lloyd's highest class. The deck erections consist of poop, bridge, and fore-

castle. A handsome saloon, state-room, and accommodation for the captain will be fitted up in the poop, comfortable quarters for the engineers and officers amidships, and for the crew forward. The hull is built with deep frames and cellular double bottom, and ballast-tank in the after-peak. Four steam winches, large patent donkey boiler, steam steering-gear placed in engine-room casing, hand screw steering gear aft, direct steam windlass, schooner rig, boats on beams overhead, grain divisions and all improved appliances for working the ship will be provided. The engines are of the three-crank triple expansion type, and are from the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, the cylinders being 18 in., 28½ in., and 47½ in. diameter, with 33 in. piston stroke, and a large steel boiler to work at a pressure of 160 lbs. per square inch. The steamer has been superintended during construction by Captain A. V. Knudsen on behalf of the owners, and the ceremony of naming her *Martha* was gracefully performed by Miss Mead, daughter of the Mayor of Hartlepool.

Harlech.—On April 1st Messrs. Austin & Son, Limited, Sunderland, launched, to the order of a London firm of shipowners, for their Continental coal trade, the steel screw steamer *Harlech*. The vessel has been specially designed for a deadweight carrying capacity of about 1,650 tons, and will be classed 100 A1 at Lloyd's under special survey. Her machinery, which will be supplied by Messrs. John Dickinson & Sons, Limited, of Sunderland, will be of the tri-compound type.

Ashfield.—On April 1st Messrs. Ropner & Son launched, at Stockton-on-Tees, to the order of Messrs. Thomas Appleby & Co., of West Hartlepool, a steel screw steamer of the following dimensions, viz.:—Length between perpendiculars, 300 ft. breadth, 43 ft. moulded depth, 22 ft. 1 in. The engines will be by Messrs. Blair & Co., Limited, having cylinders 20½ in., 35 in., and 59½ in. by 39 in. stroke, steam being supplied by two large steel boilers, working at 200 lbs. pressure. The steamer has been built under the inspection of Captain Baker, the owners' marine superintendent, and was christened *Ashfield*.

Tai-Hoku.—On Friday, April 2nd, Sir Raylton Dixon & Co. launched from their Cleveland Dockyards, Middlesbrough, a fine mail and passenger steamer, built to the order of the Osaka Shoshen Kabushiki Kaisha of Japan. Her principal dimensions are:—Length, 343 ft.; beam, 43 ft.; depth, moulded, 28 ft. She is built to Lloyd's highest class, spar deck rule, with upper decks all of teak. Handsome accommodation will be fitted for about 30 first-class passengers in fore part of bridge, with large dining saloon, reading-room, smoke-room, &c., in house on bridge, and for 50 second-class at after-end of bridge and in poop, also for 300 emigrants in main 'tween decks. Powerful triple-expansion engines will be fitted by Messrs T. Richardson & Sons, Limited, Hartlepool having cylinders 28 in., 46 in., and 77 in., by 48 in. stroke, supplied with steam by two double-ended boilers 14 ft. by 16 ft. 6 in., and two single-ended 14 ft. by 10 ft., working at 180 lbs. pressure, which it is anticipated will drive the vessel a speed of 15 knots. She will also be fitted with a manganese bronze-bladed propeller. See's ash ejector, Weir's evaporator, feed heater, &c., &c. On leaving the ways she was gracefully named *Tai-Hoku* by Mrs. Waynman Dixon, Grove Hill Lodge, Middlesbrough.

Ulster.—On April 3rd Messrs. Cochrane & Cooper launched, at Beverley, an iron steam trawler of 193 tons gross. She is owned by the Union Steam Fishing Co., of Grimsby, will be classed 100 A1, and was named the *Ulster*.

Swallow.—On April 3rd Messrs. Edwards Bros. launched at North Shields the steam trawler *Swallow*. She is a vessel of 245 tons gross, will class 100 A1, and is owned by Messrs. Kelsall Bros. & Co., Hull.

Portugalete.—On April 5th Messrs. R. Craggs & Sons launched at Middlesbrough the steel steamer *Portugalete*. Her dimensions are:—Length, 281 ft.; breadth, 40 ft.; depth, 18¾ ft. She is a vessel of 2,090 tons gross register and 3,000 tons deadweight. She will class 100 A1, and is owned by Signor Alexander de la Sota, of Bilbao.

Malta.—On April 6th Messrs. Cochrane & Cooper launched at Beverley the iron steam trawler *Malta*. She is a vessel of 135 tons gross, will class 100 A1, and is owned by Mr. W. Grant, of Grimsby.

Northville.—On April 6th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a steel screw steamer, which has been built to the order of Messrs. Balls & Stansfield, North Shields, of the following dimensions:—Length, 304 ft.; breadth, 44 ft.; depth moulded, 23 ft. 1 in.; her deadweight capacity being about 4,100 tons on a light draught. The vessel is of the improved single deck type, having cellular bottom fore and aft, half poop aft containing cabins, long bridge and topgallant forecastle, and is fitted with all the latest improvements for the rapid and efficient handling of cargoes. Her engines, also constructed by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 23 in., 37½ in., and 61½ in., by 39 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. As the vessel left the ways she was named the *Northville* by Mrs. Balls.

Jupiter.—On April 14th Messrs. William Dobson & Co. launched from their yard at Newcastle-on-Tyne a tank steamer for service on the Volga. The vessel, which has been constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, is built to the order of Messrs. Lane & Macandrew, of London, and is of the following dimensions:—275 ft. by 32 ft. by 19 ft. 8 in., and is specially designed for transport to her destination. She has twin-screw compound surface condensing engines with cylinders 24 in. 46 in., and 27 in., built by the Wallsend Slipway and Engineering Co., of Newcastle, and is to develop a speed of 11½ knots, fully loaded, and steam is supplied from two boilers, 14 ft. by 12 ft., fitted for oil burning as well as coal consumption. The vessel has a complete outfit of winches and pumps and is lighted throughout with electric light.

Uranus.—On Thursday, April 15th, there was launched from the yard of the Sunderland Shipbuilding Co., Limited, a steel screw steamer, 210 ft. b.p., by 32 ft. breadth, and 16 ft. 6 in. depth, built to the highest class at Lloyd's, under special survey, having raised quarter-deck, bridge, and top gallant forecastle. The engineers' messroom and all accommodation for the captain and officers is placed amidships. The vessel is provided with steam winches by Robert Welford, and patent windlass by Messrs. Clarke Chapman & Co.; combined hand and steam steering gear by Messrs. Donkin & Co., and has extra large hatches to facilitate the loading and discharging of cargo; tri-compound engines by the North-Eastern Marine Engineering Co., Limited, Sunderland, having cylinders 17 in., 28 in., and 46 in. by 30 in. stroke, 160 lbs. pressure, which include all the latest improvements in marine engineering. The vessel is built for the Baltic trade and with a view to carrying a large deck cargo, and has large internal capacity, and will carry a deadweight of 1,500 tons on 15 ft. mean draught. During construction both hull and machinery have been inspected by Captain Bauer and Mr. Siemens, on behalf of the owners, The Neptun Co., of Bremen. On leaving the ways she was christened the *Uranus* by Miss Adam, of Newcastle-on-Tyne.

Eveline.—On April 15th Messrs. Wm. Gray & Co., Limited, launched a fine steel screw steamer, which they have built to the order of Messrs. Pyman, Bell & Co., of Newcastle-on-Tyne. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., will be fitted in the poop, the engineers' rooms on the bridge, and the crew's accommodation forward. The hull is built on the web-frame principle, with a cellular double bottom, large hatchways, powerful steam winches, steam steering gear amidships, hand screw gear aft, patent donkey-boiler, patent direct steam-windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply triple-expansion engines, having cylinders 23 in., 36 in., and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The ceremony of christening the steamer *Eveline* was gracefully performed by Miss Eveline Bell, daughter of Alderman Thomas Bell, of Newcastle-on-Tyne, managing owner.

Moravia.—This vessel was launched on April 15th by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and has been built to the order of Messrs. The Austrian Lloyd's Steam Navigation Co., Trieste. She is intended for their well-known cargo and passenger

trade, and is the fourth vessel built for them by this firm. Her principal dimensions are:—Length between perpendiculars, 354 ft.; breadth, extreme, 48 ft. 6 in.; depth moulded, 25 ft. and she is designed to have a deadweight carrying capacity of about 5,500 tons with a moderate draught of water. She is built to Lloyd's 100 A1 class on the three deck rules, and has a poop aft, a long bridge amidships, and a topgallant forecastle. On the forward end of the bridge deck is placed a large saloon house, with entrance to the passenger berths, which are placed in the bridge under the saloon. The saloon is a large handsome apartment arranged to seat the whole of the first-class passengers at one time, and the whole of the accommodation is fitted in first-class style, with all modern requirements. On top of the saloon house is placed the chart and wheel house with a flying bridge across the front. The deck machinery consists of seven powerful steam winches, patent steam capstan windlass, patent steam steering gear at the aft end of casings, with controlling gear on the forward end of the bridge, and powerful screw gear aft. The deck machinery is worked by a large multitubular donkey boiler working at 180 lbs. pressure. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited, Sunderland. The engines are built on the triple-expansion principle, the sizes of the cylinders being 24 in., 40 in., and 64 in., by 45 in. stroke, the large multitubular boiler working at 180 lbs. pressure. Both ship and engines are built to special requirements, and are complete in every respect for a first-class cargo and passenger vessel. The hull and engines have been constructed under the personal supervision of Mr. Vico Vecchi on behalf of the owners. The vessel was launched by hydraulic power and christened by Mrs. Charles E. Thompson.

Steel Screw Steamer.—On Thursday, April 15th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer, built to the order of Messrs. Wm. Milburn & Co., of Newcastle-on-Tyne, of the following dimensions, viz:—Length, 345 ft.; breadth, 46 ft.; depth, 27 ft.; and to class 100 A1 at Lloyd's on the spar deck rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including nine double cylindered steam winches, direct acting steam windlass, large donkey boiler, working at 180 lbs., steam steering gear by Messrs. Donkin & Co., Limited, and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. The North Eastern Marine Engineering Co., are of the triple-expansion type, having cylinders 24 in., 40 in., and 64 in. by 45 in. stroke, and working at a pressure of 180 lbs.

Tropic.—On April 15th Messrs. R. and W. Hawthorn, Leslie & Co., Limited, launched at Hebburn-on-Tyne a steel twin screw passenger and cargo steamer, 225 ft. by 32 ft. by 14 ft. 4 in., the third of four building to the order of the Eastern Carrying, Storing, Warrant and Insurance Co., of St. Petersburg. The vessel is built to the requirements of Bureau Veritas, and designed and fitted throughout to meet the special Caspian Sea trade for which the company intend her. The vessel was named *Tropic*.

Russ.—On Saturday, April 17th, Sir Raylton Dixon & Co. launched from their Cleveland Dockyard, Middlesbrough, a fine cargo steamer for Adolf Carl, Esq., of Copenhagen. Her principal dimensions are:—Length, 325 ft.; beam, 43 ft.; depth, moulded, 22 ft. 11 in.; and has a deadweight carrying capacity of about 4,200 tons on 19 ft. 6 in. draught of water. She is built to British Corporation's highest class, single-deck rule, and has water ballast in after peak and cellular bottom; upper poop and bridge decks of steel, five watertight bulkheads, &c. The accommodation for captain and officers will be handsomely fitted up in houses on bridge deck, with engineers under the bridge, and crew in topgallant forecastle. Triple-expansion engines will be fitted by Messrs George Clark, Limited, Sunderland, having cylinders 22 in., 36½ in., 60 in. by 42 in. stroke, supplied with steam by two large single-ended boilers, working at 160 lbs. pressure. On leaving the ways the vessel was gracefully christened *Russ* by Miss Neilsen, daughter of the Danish Consul at Hartlepool.

Foylemore.—On Saturday afternoon, April 17th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length over all, 342 ft.; breadth, extreme, 46 ft.; depth, moulded, 26 ft. 9 in.; tonnage, gross, 3,220 tons. This vessel, which has been built to the order of Messrs. W. Johnston & Co., Limited, of Liverpool, will class 100 A1 at Lloyd's, under special survey. She is of the single-deck type, with short poop aft, long bridge amidships, with engineers' accommodation in after end, captain and officers being berthed in a large house on bridge deck, and crew in topgallant forecastle. A cellular double-bottom throughout, and peaks are fitted for water ballast, and equipment includes six steam winches, large multitubular donkey boiler by Messrs. Blair & Co., steam windlass, stockless anchors, steam steering gear, double derricks to all hatches, &c., &c. The engines, by Messrs. Blair & Co., Limited, are triple-expansion, having cylinders 22½ in., 39½ in. and 67 in. by 42 in. stroke, steam being supplied by two single-ended boilers, with a working pressure of 200 lbs. The vessel was named *Foylemore*.

Clan Murray.—On April 17th there was launched by Messrs Doxford & Sons, at Sunderland, the second of the large "Clan" steamers now in course of construction for Messrs. Cayzer, Irvine & Co, Glasgow, for the Bombay trade. The vessel is 400 ft. by 50 ft. by 30½ ft., of the turret deck type, and is classed under the special survey of the British Corporation, Glasgow, and has been under the immediate superintendence of their local representative, Mr. Macdonald. The vessel was named the *Clan Murray*, by Miss Lyall, daughter of the superintending engineer for the company. The steamer's gross register is about 5,000 tons, and she is to be fitted with tri-compound engines of 3,000 I.H.P., giving the vessel a mean speed of about 12 knots.

Carmanian.—On April 19th there was launched by Messrs. R. Williamson & Son, at Workington, a full-rigged ship of the following dimensions:—Length, 260 ft.; breadth, 38 ft. 7 in.; and depth of hold, 23ft. 6 in. The vessel will have a net register of 1,770 tons, and a carrying capacity of 2,850 tons. She was named the *Carmanian*.

Ben Nevis.—Lately Messrs. Eltringham launched at South Shields the screw trawler *Ben Nevis*. This is the second of the North British Fishery Co.'s boats. They are built for trawling at North Shields and Aberdeen, and are managed by Mr. J. H. Irvin. The *Ben Nevis* is 100 ft. over all and 19 ft. beam, 45 H.P., and is built according to Lloyd's requirements.

Briton.—On April 21st there was launched from the yard of the Sunderland Shipbuilding Co., Limited, to the order of W. Hawthorn, Esq., of Cowes, I.W., a steel screw steamer, 206 ft. between perpendiculars by 30 ft. breadth by 14 ft. 2 in. depth, classed 100 A1 at Lloyd's, under special survey, having raised quarter-deck, bridge and topgallant forecastle. The officers' and engineers' messroom and accommodation is placed amidships, whilst the captain is berthed in house on deck. The vessel is provided with steam winches by Mr. R. Welford, of Pallion, and has large hatches to suit the trade for which the boat is intended, steam steering gear by Messrs. Donkin & Co., patent windlass by Messrs. Emerson, Walker & Thompson, Bros., Limited, tri-compound engines by Messrs. The North Eastern Marine Engineering Co., Limited, Sunderland, having cylinders 17 in., 28 in. and 46 in. by 30 in. stroke, 170 lbs. working pressure, which include all the latest improvements in marine engineering. The vessel is built upon very fine lines for a boat of this type, and will carry on 13½ ft. draught of water 1,000 tons deadweight, on the exceedingly low net register tonnage of about 230. Her speed loaded will be eleven knots average. Several steamers of this class have been built by this company, all carrying a very large cargo upon a similarly small net tonnage. During construction both hull and machinery have been inspected by Mr. Reed on behalf of the owner, and upon leaving the ways she was gracefully named *Briton* by Mrs. Roland Philipson, of Tynemouth.

LAUNCHES—Scotch.

Linnet.—On March 20th a steel schooner-rigged steamer of 125 tons, named the *Linnet*, was launched at Aberdeen for Messrs. J. Lewis & Sons, of Aberdeen.

Champion.—On March 22nd a steel schooner-rigged steamer of 160 tons, named the *Champion*, was launched at Aberdeen for Mr. F. Deolin, jun., of Granton.

Annette.—On March 31st Messrs. David J. Dunlop & Co., engineers and shipbuilders, Inch Works, Port-Glasgow, launched a very handsomely designed steel screw steam yacht for Monsieur

Charles Canaple, Marseilles, of the following dimensions;—Length on load water line, 88 ft.; breadth, moulded, 14 ft. 6 in.; depth moulded, 10 ft.; and 87 tons Royal Thames yacht measurement, the engines for the yacht being of the triple-expansion type, having cylinders 9 in., 15 in., and 24 in. diameter, by 15 in. length of stroke, with boiler 9 ft. 6 in. diameter by 8 ft. long, all proportioned for a working pressure of 170 lbs. per square inch. The yacht has been built to Lloyd's 100 A1 class under special survey, and is smartly rigged as a two-masted schooner. The owner's accommodation has been specially arranged, and is handsomely fitted up in solid oak panels, with all the hardwood furniture and fittings finished in a chaste manner to correspond. The forward part of the vessel from cross coal bunker is set apart for this accommodation. The quarters for the crew are fitted up aft, whilst the captain and engineers have each a separate cabin abaft the engine-room bulkhead, with access to deck through after accommodation, and also to engine-room through doorway in engine-room bulkhead, this door being watertight fitting, should occasion arise to use it as such. The deck fittings include one of Reid's patent steam windlasses and two yacht's boats. The *Annette*, on leaving the ways, was gracefully christened by Madame Canaple.

Latharna.—On March 31st there was launched by the Ailsa Shipbuilding Co. a steel screw steam yacht for Mr. Hugh H. Smiley, of Larne, built to design by Mr. G. L. Watson. Her dimensions are:—Length on load water line, 161 ft.; breadth, moulded, 23 ft. 6 in.; depth moulded, 14 ft. 3 in; and she is to be fitted by Messrs. Muir & Houston, Limited, with triple-expansion engines 14 in., 22 in., and 36 in. by 24 in. stroke. She is to have a complete installation of electric light throughout, hot water heating arrangement and refrigerating plant, and all modern appliances for comfort and efficient navigation. As she left the ways, she was named the *Latharna* by Mrs. Smiley.

Gunilda.—On Thursday, April 1st, Messrs. Ramage & Ferguson, Limited, launched from their yard at Leith a full-powered steel steam yacht of about 500 tons y.m., built to the order of Messrs. A. R. & J. M. Sladen, Windermere, from the designs of Messrs. Cox & King, London. The yacht is built of steel to the highest class at Lloyd's, and has triple-expansion engines of the builders' make, supplied with steam from two boilers, and all designed to propel her at a high rate of speed. The accommodation is very large for a yacht of this size, comprising dining, drawing, and smoke rooms on main deck, with promenade deck above, while on lower deck a large number of state rooms are placed for owners and their friends. On leaving the ways the yacht was named *Gunilda* by Miss Muir, Windermere.

Valparaiso.—On April 2nd Messrs. Fleming & Ferguson, Limited, shipbuilders and engineers, Paisley, launched from their yard a powerful screw tug-steamer, *Valparaiso*, built by them for the Chilian Government.

Rosslyn Castle.—On April 3rd Messrs. Hawthorns & Co., Limited, launched from their yard a steam trawler to the order of Mr. J. A. Smith, Hull. Her dimensions are: 111 ft. 6 in. b.p., 21 ft. beam, and 11 ft. 3 in. depth of hold. She will be supplied and fitted by the builders with triple-expansion engines having cylinders 13 in., 21 in., and 34 in. by 24 in., working at a pressure of 170 lbs. She will have all the latest improvements for trawling purposes, including otter trawl gear. As she left the ways she was named *Rosslyn Castle* by Miss Smith, daughter of the owner.

Sanuki Maru.—On April 3rd Messrs. Napier, Shanks & Bell, Yoker, launched the *Sanuki Maru*, the second of three twin-screw steamers being constructed by them for the Nippon Yusen Kaisha, of Tokio, Japan. This vessel, like her sister ship, the *Kawachi Maru*, recently launched, is about 6,000 tons, of the "three-deck" type, with poop bridge and forecastle, and partial shade-deck, constructed to Lloyd's 100 A1 class, and also to Board of Trade requirements for passengers. The *Sanuki Maru* is adapted for carrying a large deadweight of cargo, is fitted with the most approved appliances for safety and economical handling of cargo, and has at the same time superior accommodation for a large number of first and second-class and steerage passengers. The vessel will also have a complete installation of electric light, including signal and Suez Canal lights. Efficient ventilation will be secured by the use of the "Grahtryx" Ventilation Co.'s special machinery and ventilators. The engines—twin-screw—supplied by Messrs. Dunsmuir & Jackson—are constructed and furnished in the best style. The vessel has been built under the supervision of Captain Periam and Mr. George Macfarlane.

Xania, Yarmouth, and Zennor.—Messrs. Mackie & Thomson have launched at Govan three steel steam trawlers, each of about 162 tons gross. They were named *Xania*, *Yarmouth*, and *Zennor*, will be classed 100 A1, and are owned by Messrs. Hagerup, Doughty & Co., of Grimsby.

Walton Belle.—On April 5th a new steamer was launched from the shipyard of Messrs. William Denny & Brothers, of Dumbarton, for the Belle Steamers Co. She is intended to extend the trade from Clacton-on-Sea to Yarmouth, and was named the *Walton Belle* by Miss White, the daughter of Deputy White, one of the directors.

Craftsmen.—On April 14th Messrs. Charles C n ll & Co. launched from their shipbuilding yard at Scotstoun the s.s. *Craftsman* for Messrs. Thomas and James Harrison, Liverpool. She has been built considerably in excess of Lloyd's requirements for their highest class, and will carry about 9,100 tons, dimensions being 450 ft. by 52 ft. 6 in. by 33 ft. 9 in. The engines, which are being fitted by Messrs. Dunsmuir & Jackson, Govan, are of the triple-expansion type, with cylinders 27½ in., 45½ in., and 75 in. by 60 in. stroke. The boilers are fitted with Howden's forced draught, and there is also a complete installation of electric lighting, and the provision for handling cargo is of the most ample and complete description.

Mandolin.—On April 15th Messrs. Ramage & Ferguson, Limited, launched a steam yacht of about 80 tons, built to the order of A. L. Hewitt, Esq., London, from their own design. The dimensions are 88 ft. 2 in. by 14 ft. and 8 ft. 9 in. moulded, and the machinery consists of a set of compound surface condensing engines with cylinders 11½ in. by 23 in. diameter, by 18 in. stroke, steam being supplied from a large boiler, working at 110 lbs. pressure. The accommodation is unusually spacious for a yacht of this size, and when completed she will make a most comfortable cruising vessel. On leaving the ways the yacht was named *Mandolin* by Mrs. A. G. Ramage, and afterwards the builders entertained the owner and his friends to lunch, when the toasts usual on such occasions were duly honoured.

Hillside.—On April 16th the Grangemouth Dockyard Co. launched from their shipyard at Grangemouth a handsomely modelled three-masted barquentine. She has been built for Colonial owners, specially for the lumber trade. Her dimensions are—158 ft. by 33 ft. 1 in. by 13 ft., and she will carry about 750 tons deadweight. She has been built under Lloyd's special survey for their 100 A1 class, and is being fitted out under the superintendence of Captain Morrell, who will command the vessel on completion. On leaving the ways she was named *Hillside* by Mrs. Lovitt, wife of owner, who was present with a company of friends.

Kyanite.—On April 17th Messrs. Scott & Sons launched from their shipbuilding yard at Bowling a screw steamer of dimensions 185 ft. by 29 ft. by 13 ft., built to the order of Mr. William Robertson, 15, Gordon Street, Glasgow. Triple-expansion engines will be fitted on board by Messrs. Muir & Houston, Limited, Kinning Park, Glasgow. On moving down the ways the steamer was named *Kyanite* by Miss Couper, of Glasgow.

Osprey.—On April 17th the Fairfield Shipbuilding and Engineering Co., Limited, launched the torpedo-boat destroyer *Osprey*, which they have built for the British Government. The *Osprey* is the second of three similar vessels building at Fairfield. They are expected to attain on trial a speed of 30 knots per hour.

Euro.—On April 20th Messrs. Gourlay Bros. & Co., launched from their yard at Dundee the screw tug steamer *Euro*, which has been built to the order of the Adelaide Steam Tug Co., under the inspection of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool. The vessel's dimensions are—130 ft. by 22 ft. 6 in. by 13 ft. 3 in., and she is built to Lloyd's class. The vessel will be fitted with salvage pump, and the usual towrails, tow-hooks, &c. Her engines will take steam from boilers of 14 ft. by 10 ft. 6 in. by 3 ft. 4 in. and are of the following dimensions:—16 in., 26 in. and 43 in., by 30 in.

Nivelle.—On A 20th Messrs. Scott & Co., Greenock, launched a steel four-masted barque named *Nivelle*, to the order of Mr. Archibald Russell, of Auchenraich (Messrs. John Hardie & Co., Glasgow, managers). Dimensions:—Length, 292 ft. 4 in.; breadth, 43 ft. 2 in.; depth, 24 ft. 2 in.; gross

tonnage. 2,429·92, with a carrying capacity of 3,800 tons. The *Nivelle* has been built to the rules of the British Corporation's highest class.

Sutton.—On April 20th Messrs. A. Rodger & Co., Port-Glasgow, launched a steel screw steamer, named *Sutton*, for Messrs. John Sunley & Co., London. Dimensions:—Length, 314 ft.; breadth, 44 ft.; depth. 20 ft. 9 in. The machinery will be supplied by Messrs. Hall Brown, Buttery & Co., Glasgow, and the steamer will be commanded by Captain Pike.

Steel Tug.—On April 20th from Camperdown shipbuilding yard, Dundee, a steel tug and salvage boat was launched for the Adelaide Steamship Co. Her tonnage is 235, and she is 137 ft. in length, 22 ft. 7 in. in breadth, and 13 ft. 3 in. in depth.

Craig-Gowan.—On April 20th a new steam liner, which has been added to the Aberdeen Craig Line of fishing vessels, was launched from the shipbuilding yard of Messrs. Hall, Russell & Co., Aberdeen. The vessel, which was named the *Craig-Gowan*, is 101 ft. in length all over, and is 112 tons gross register. She will be fitted with steel boilers and compound engines of 210 I.H.P. and will be classed 100 A at Lloyd's.

Anaces.—On April 20th Messrs. Russell & Co., launched from Kingston Yard, Port-Glasgow, the screw-steamer *Anaces*. This vessel is 3,300 tons gross, with a deadweight carrying capacity of 4,150 tons. She measures—Length, 310 ft.; width, 44 ft.; depth, 22 ft. 10½ in. The owners are Messrs. Soley & Co., Limited, Liverpool. Triple-expansion engines will be supplied by Messrs. Kincaid & Co., Greenock.

B.D. 2.—On April 22nd Messrs. Wm. Simons & Co., Limited, Renfrew, launched from their yard a powerful barge loading dredger, which they have constructed under the direction of John M. McCurrich, Esq., M.Inst.C.E., engineer to the Bristol Docks Board. This vessel is designed to load into 600 ton barges, and is able to dredge its own flotation to a depth of 32 ft. below the water level. Compound surface condensing engines are fitted to propel the vessel and drive the dredging machinery. The bow and stern winches and hoisting gear are driven by independent engines. The dredger, which is named *B.D. 2*, was launched complete with buckets all up ready for work, and is intended to steam to Bristol in a few days.

LAUNCHES.—Irish.

Ormara.—On March 25th a steel steamer of about 3,780 gross tonnage, named the *Ormara*, was launched at Belfast for Messrs. R. and C. Allan, Glasgow.

Beverley.—On March 25th a steel steamer of about 1,450 gross tonnage, named the *Beverley*, was launched at Belfast for Messrs. R. and C. Allan, Glasgow.

Gyria.—On April 17th a large steamer, built to the order of the Cunard Co., was launched by Messrs. Workman, Clark & Co. at Belfast. The *Gyria*, as the new Cunarder is named, will have a carrying capacity of 5,000 tons, and will be engaged in the company's Mediterranean trade. She is the second of three steamers ordered from Messrs. Workman, Clark & Co. by the Cunard Co.

LAUNCH.—Japanese.

Oigawa-Maru.—On Wednesday, February 17th, there was launched from the Osaka Ironworks, Dock and Shipbuilding Yard (Tekko-sho) the twin-screw steamship *Oigawa-Maru*, 600 tons gross, built to the order of the Osaka Shosen Kaisha (Osaka Steamship Co.), being the first of three sister-vessels ordered from the same yard by the same owners, and intended for the Inland Sea mail service. She is 170 ft. in length, 25 ft. in beam, and 17 ft. in depth of hold. The hull is built entirely of steel, on the spar-deck principle, to the highest class of Japanese Board of Trade requirements, with four watertight compartments, and she is to be handsomely fitted up for first, second, and third-class passengers. The run between Osaka and Bakan *via* ports passes through some very narrow and intricate channels, quite impassable for large craft; the design of the *Oigawa-Maru* touches the limit of possibility in this direction, and the reason for providing her with twin-screws is that a single propeller would not give sufficient speed with her light draught. The engines, supplied by the builders, are of triple-expansion type, indicating 800 H.P.; cylinders 12 in., 18 in. and 31 in. diameter, 22 in. stroke. Steam is supplied by one large single-ended boiler, constructed to work at 160 lbs. pressure to the square inch. The machinery department is to be supplied with every modern improvement for economical working. The ship will be fitted with steam windlass and steam winches, as well as side ports for greater facility in loading and discharging cargo. She will have two pole masts, with awnings fore and aft the whole length of the ship. As the vessel was launched the visitors who had been invited by the Tekko-sho threw showers of rice cakes after the *Oigawa-maru* for good luck. She will be ready for her trial trip in about two months, when it is expected she will make over 14 knots.

LAUNCH.—Norway.

Belvernon.—On April 3rd Messrs. Bergens Mekaniske Værksted, Bergen, Norway, launched from their yard a steel-screw steamer of the following dimensions:—Length, over all, 287 ft.; breadth, moulded, 31 ft. 6 in.; depth, moulded, 15 ft. 8 in. The ship is built to the highest class in the Norwegian Veritas, and has raised quarterdeck, bridge and topgallant forecastle. Cellular double bottom for water ballast in main and after holds and trimming tanks fore and aft., steam steering gear, steam windlass, three steam winches, &c. Every modern improvement has been embodied in her construction and outfit, including electric light. She is built especially for the American fruit trade, and has a large number of ventilators to the holds. The engines are triple-compound with cylinders 18½ in., 30 in. and 50 in. diameter and 33 in. stroke. Two large boilers, constructed for a working pressure of 175 lbs. per square inch. Speed about 12 knots. The ship was named the *Belvernon*, and is built to the order of Harald Irgens, Esq., of this port.

TRIAL TRIPS.

Duchess of Devonshire.—The twin-screw steamer *Duchess of Devonshire*, which arrived at Greenock from Barrow on March 23rd, and on that day performed the natural draught trials, was detained, owing to the severe weather until March 26th, when the full-speed trials were completed. During a fresh gale a mean speed of over 19 knots was attained on the measured mile, and thereafter full speed was maintained for six hours. This more than fulfilled the guarantee of the builders, and taking into account the very severe weather, was highly satisfactory to all concerned. The *Duchess of Devonshire* then proceeded to Barrow, encountering on returning a similar gale to that which was experienced coming to the Clyde, and the vessel demonstrated her excellent sea-going qualities. The vessel has been built by the Naval Construction and Armaments Co., for Messrs. James Little & Co.'s Barrow line of steamers, in connection with the Midland and Furness Railway Co's. The dimensions of the vessel are:—Length, 300 ft. between perpendiculars: breadth, moulded, 35 ft.; depth, moulded to main deck, 15 ft., having above the main deck a promenade deck the entire length of the vessel, and over this a long bridge deck with large and handsome accommodation for first-class passengers amidships and for second-class passengers aft. During the summer months the *Duchess of Devonshire* will run between Barrow and the Isle of Man, and in the winter season she will be engaged in the Barrow and Belfast trade. Her speed trials prove that she will be able to make the Isle of Man passage in about 2½ hours, and the Belfast passage in about six hours.

Trevilley.—On March 30th the trial trip of the new screw steamer, *Trevilley*, built by Messrs. John Readhead & Sons, South Shields, to the order of Messrs. E. Hain & Son, St. Ives, Cornwall, took place off the Tyne. The vessel is 323 ft. in length, 47 ft. broad, and 25 ft depth, moulded, and is classed 100 A1 at Lloyd's. She is of the improved single-deck type, her deadweight capacity being 5,100 tons on a light draught. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 24 in., 40 in., and 64 in. in diameter, with 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. During the trial the machinery worked very smoothly, the trial altogether being satisfactory to both builders and owners.

Kawachi Maru.—On April 1st the twin-screw steamer *Kawachi Maru*, recently launched from the yard of Messrs. Napier, Shanks & Bell, Yoker, completed her trials on the Clyde. A mean speed on the measured mile of nearly 14 knots was obtained, this being considered highly satisfactory. The *Kawachi Maru* is a three-decked vessel, constructed to Lloyd's 100 A1 class, and also to Board of Trade requirements for passengers. Her dimensions are:—Length, between perpendiculars, 445 ft., and breadth 49 ft., with a gross tonnage of about 6,000 tons. She is the first of three vessels being constructed by this firm for the Nippon Yusen Kaisha, of Tokio, Japan, the machinery being supplied by Messrs. Dunsmuir & Jackson, Govan.

Britannic.—On April 2nd the steamer *Britannic* left West Hartlepool for her official trial trip. The vessel is 336 ft. long, 47 ft. broad, and 24 ft. 10 in. deep, and has been built by Messrs. William Gray & Co. to the order of Messrs. W. H. Cockerline & Co., Hull, to take Lloyd's highest class. The engines are of the triple-expansion type, built by the Central Marine Engine Works, the cylinders being 24 in., 38 in. and 64 in., with a piston stroke of 42 in., steam being generated in two extra large steel boilers, fitted with the "arched Purves'" ribbed form of furnace, and constructed for a working pressure of 160 lbs. per square inch. The hull and machinery have been constructed under the personal supervision of Mr. George H. Strong, M.I.N.A., consulting engineer, Hull, who was present at the trial trip as representing the owners; there being also present Captain Murrell and Mr. Lindsay, on behalf of the builders of the ship and engines respectively. The *Britannic* underwent the usual manœuvring in the Bay, the weather being most boisterous and causing racing of the engines, but everything was found to work admirably, and the vessel then proceeded to Memel on her maiden voyage, Captain S. Bolton in command.

Kerry.—On April 2nd the steel screw-steamer, *Kerry*, built and engined by Messrs. Blackwood & Gordon, Port-Glasgow, for the City of Dublin Steam Packet Co., Dublin, for this company's traffic between Ireland and England, went down the Firth on her official trial runs. The weather was magnificent. Among those on board were:—Mr. William Watson, managing director of the City of Dublin Co.; Mr. E. G. Ferber, superintending engineer of the City of Dublin Co.; Mr. D. B. McGeoch, partner of Messrs. Blackwood and Gordon; Mrs. D. B. McGeoch; Mr. F. P. Purvis, partner of Messrs. Blackwood & Gordon; Mrs. F. P. Purvis; Mr. Wm. Watson, superintending engineer of the Clyde Shipping Co., Limited, Greenock; Mr. T. A. Crompton, London; Mr. T. Rowley, Board of Trade surveyor, Greenock; Mr. A. D. Wedgwood, Dumbarton; Mr. W. A. Taylor, Liverpool; Mr. Chas. R. Stewart, Glasgow; Mr. and Mrs. Jas. Craig, Gourock; Mr. A. Harris, Greenock, and others. Letters of apology for absence were received from:—Mr. A. W. Archer, of Drogheda Steam Packet Co., Drogheda; Mr. E. Swinson of the Dundalk and Newry Steam Packet Co., Dundalk; Sir John Burns, Mr. Jas. C. Burns and Mr. George Burns, Glasgow; Messrs. Geo. J. Kidston and Jas. Cuthbert, of the Clyde Shipping Co., Glasgow; Mr. Geo. Sloan, of Messrs. Wm. Sloan & Co., Glasgow; Mr. Andrew Stewart, of Messrs. Stewart & Clydesdale, Glasgow; Mr. John Neilson, steel merchant, Glasgow; Mr. Wm. McConnell, of Messrs. A. A. Laird & Co., Glasgow. The *Kerry* is the fifth steamer built and engined by Messrs. Blackwood & Gordon for the City of Dublin Steam Packet Co., the others being, *Galway*, *Louth*, *Wicklow* and *Carlow*. The *Kerry* is a duplicate of the *Carlow*, and will be commanded by Captain Conlon, the engine-room being in charge of Mr. R. Spence, both old servants of the company. Her principal dimensions, are:—Length, 260 ft.; breadth, 34 ft.; depth, 16 ft. 9 in., and is of 1,270 tons gross register. The engines are triple-expansion, with bronze propeller and large boilers capable of working up to fully 3,000 H.P. She is specially adapted for the cross channel traffic between Liverpool and Dublin, and is fitted to carry 500 cattle, while on the upper deck sheep fittings are arranged. The most approved method of ventilation has been adopted to ensure the safe and comfortable transit of cattle. Besides ample accommodation for steerage passengers and a well-ventilated cabin for the exclusive use of cattle dealers, there is on the poop deck private cabins for 30 first-class passengers. The main saloon has additional accommodation for 70 passengers, making 100 in all. The private cabins and the saloon are handsomely furnished, well lighted and ventilated, and the steamer is fitted throughout with electric light by Messrs. Siemens Bros., London. Special attention has been given to the apartments for officers and crew. The trial consisted of six hours consecutive steaming, with the machinery working at a uniform rate of 100 revolutions per minute, the lights from Cloch to Cumbrae were run four times, during which a mean speed of 15¼ knots was attained, being ¾ of a knot beyond the guarantee. After dinner Mr. D. B. McGeoch proposed "Success to the *Kerry*." He said the *Kerry* had had a very fortunate day both as to weather conditions and the speed she attained: she was the fifth steamer his firm had built for the City of Dublin Steam Packet Co. She had given satisfaction so far, and he had no doubt if she gave the same satisfaction as the others had done when on her station, the owners might be induced to place a sixth with them to build. The *Kerry* proceeded that night to Liverpool, and would take up her station on Monday, and if she proved as successful as her predecessors she would be a profit to her owners and a credit to them. Mr. William Watson replying, said it was very gratifying to them that the fifth vessel built for them by Messrs. Blackwood & Gordon (the fourth of her class) had a very satisfactory trial, the three steamers of the same class had been running continuously, and what was more satisfactory was that they generally did the whole distance at the same speed they attained at their trials on the Clyde. The distance is 120 miles, and they constantly make it in eight hours, which brought out exactly fifteen knots an hour. The public and the members of the cattle trade had pronounced them to be most satisfactory, in every particular they had been most successful; he should think that if the trade required an additional steamer to be built they would be very unwilling to go past Messrs. Blackwood & Gordon. Mr. McGeoch then proposed the "City of Dublin Steam Packet Co." In replying, Mr. Watson said the first of their new mail service steamers between Dublin and Holyhead had commenced the day previous, when the time had been accelerated by half an hour; he crossed himself in the two first trips, and he had since had a telegraphic communication saying they had gone faster still, and considerably within the time the company had contracted for with the Post Office. The City of Dublin Co. was 74 years old, for nearly 60 years they had carried the mails, first from Dublin to Liverpool, and from 1850 from Dublin to Holyhead, they hoped to be doing so for a long time to come. Mr. Watson next proposed the "Builders," which was replied to by Mr. F. P. Purvis. The "Officials" of the City of Dublin Steam Packet Co. was given by Mr. McGeoch and responded to by Mr. Ferber. The "Press" was proposed by Mr. Watson and responded to by Mr. Mackay, of the *Irish Times*, Dublin. The chairman read a letter of apology from Mr. McConnell of the "Laird Line," in which he said the *Daisy* and *Lily*, recently built for his company by Messrs. Blackwood & Gordon, were doing splendid work. The weather throughout the cruise was exceedingly fine and the party were landed at Gourock Pier in the afternoon.

Moana.—On Monday, April 5th, the steel screw steamer *Moana* proceeded on her trial trip down the Firth. This vessel has been built by Messrs. William Denny & Brothers, of Dumbarton, for the Union Steamship Co., Limited, of New Zealand, and has been specially designed for their rapidly growing passenger service between San Francisco and the Colonies. Her dimensions are as follows:—Length between perpendiculars, 350 ft.; breadth, moulded, 44 ft.; depth to upper deck, 34 ft. She has a tonnage of 3,915 tons gross, and has been built to the highest class of the British Corporation. The hull is subdivided by seven water-tight bulkheads, and is fitted with a double bottom for carrying water-ballast. This vessel, although carrying no less than 3,600 tons deadweight, has been primarily designed for passenger service, and with this object in view has been fitted with all the most modern and approved appliances which are demanded by the luxury of modern travel, and which the skill of the builders' and owners' representatives could suggest. The principal saloon is on the main deck aft, and is a magnificent apartment of about 50 ft. by 40 ft., and has accommodation for dining at one time no less than 110 passengers. The passengers' state-rooms are arranged principally on the main deck forward and abaft of the main saloon. There is accommodation provided for about 180 first-class passengers and 116 second-class. Of these latter, 80 berths have been specially arranged so as to form an adjunct to the first-class if so desired at any time. One important feature of the passenger arrangement is the long broad alleyways on each side of the ship, it being possible when the doors are open to

see from one end of the vessel to the other in an unbroken line. A special feature of this vessel is the very large number of deck cabins arranged in central deckhouses on the upper deck. These have been specially considered so as to give light and airy apartments suitable for tropical service. On the upper deck adjoining the music-room and deck cabins has been placed the smoking-room. The second-class passenger accommodation is on the main deck forward of the boiler-room. The saloon is a large, comfortable and airy apartment. There is dining accommodation for 74 passengers. The second-class cabins are fitted forward and aft of this saloon. The vessel has been provided throughout with electric light. The vessel has been fitted throughout with hydraulic cargo gear by Messrs. Brown Brothers, of Edinburgh, and is provided with their latest departure in hydraulic derricks. This conduces to rapid working of cargo, and, being being practically noiseless, does not interfere with the comfort of passengers. The steering gear is by the same firm, and is one of their well-known steam tillers. A powerful steam windlass and capstan is fitted forward, and aft there is a small warping capstan by Messrs. M. Paul & Co. The speed attained on the trial on measured mile was 17 knots as a mean of two runs. The machinery, which has been supplied by Messrs. Denny & Co., is of the triple-expansion type, the cylinders being 33 in., 53½ in. and 85 in. diameter, with piston stroke of 4 ft. 6 in. Steam is supplied by two cylindrical double-ended tubular boilers, about 15 ft. diameter, and having twelve furnaces. Howden's system of forced draught is employed, and the steam pressure is 170 lbs. In addition to the above there is a large donkey boiler about 10 ft. 6 in. diameter, constructed for the same working pressure, and which can, if necessary, be used in conjunction with the main boilers.

Annette.—On April 5th this steam yacht, built for Mons. Charles Canaple, of Marseilles, by Messrs. David J. Dunlop & Co., engineers and shipbuilders, Inch Works, Port-Glasgow, ran her official speed trials over the measured mile at Skelmorlie, the builders having the machinery and boiler fitted on board and the vessel ready for steaming trials in the short space of three days. The most satisfactory results were obtained. A mean speed of nearly 11 knots per hour was steadily maintained for two hours' running. On completion of the trials the *Annette* was steamed into the James Watt Dock, Greenock, to complete her outfit and coaling, preparatory to leaving for Marseilles.

Malvina.—On April 6th the London and Edinburgh Shipping Co.'s steamer *Malvina* ran down the Firth of Forth to the Bass Rock, for the purpose of trying a new propeller of manganese bronze, designed by Mr. R. Young, the company's superintendent. The trial was very satisfactory, the vessel on the journey down and up the Firth averaging a speed of 16½ knots.

Lady Roberts.—On Thursday, April 8th, the s.s. *Lady Roberts* built by the Ailsa Shipbuilding Co., Troon, for the British and Irish Steam Packet Co., Limited, Dublin, for their passenger and cargo trade between Dublin and London, ran her official trial on the measured mile at Skelmorlie. The result was very satisfactory, being a mean of 14·6 knots per hour. The engines were fitted by Messrs. Dunsmuir & Jackson. The company on board included Mr. O'Connor, director, and Mr. Egan, secretary of the British and Irish Steam Packet Co., the Marquis of Ailsa and other partners of the builders' firm, and Mr. Dunsmuir.

Ashanti.—On April 8th, the s.s. *Ashanti*, a fine steel screw steamer, built to the order of Messrs. Elder, Dempster & Co., of Liverpool, by Messrs. C. S. Swan & Hunter, Limited, Wallsend, went out on trial trip, and after several runs on the measured mile a speed of over 11 knots was obtained, which was considered very satisfactory. The owners were represented by Mr. Ward, Captain Evans, and Mr. Lees, the latter two gentlemen having superintended the construction of the ship and engines. The principal dimensions of the steamer are—340 ft. by 45 ft. 3 in. by 28 ft. 9 in. moulded depth. Two decks laid, full poop, long bridge-house amidships, and full topgallant forecastle. Accommodation for captain, officers and engineers on top of the bridge deck, cellular double bottom, six steam winches, and all modern appliances for the rapid discharge of cargo. The engines are by the North-Eastern Marine Engineering Co., of Wallsend, having cylinders 24 in., 40 in., 64 in. by 42 in. stroke, two large boilers, working pressure 170 lbs. The vessel is classed 100 A1 at Lloyd's, and built under special survey.

Admiral Ihlen.—On Monday, April 12th, the s.s. *Admiral Ihlen*, built by Messrs. Craig, Taylor & Co., Thornaby-on-Tees, for Messrs. Mail & Holby, of Christiania, was taken to sea for her trial trip, which proved very satisfactory. The dimensions of the vessel are 280 ft. by 41 ft. by 18 ft. 9 in., and she will carry 3,100 tons on a light draught of water. The engines, by Sir Christopher Furness, Westgarth & Co., Limited, Middlesbro', are 20 in., 32½ in. and 53 in. by 36 in. stroke, with two boilers working at 160 lbs. pressure. These worked without the slightest hitch and a speed of about 11¼ knots was obtained. The vessel has been built to Lloyd's highest class, also to Det Norske Veritas. After adjusting compasses the vessel at once proceeded to the Tyne to load, under the command of Captain Carl Andersen.

Leon Pauilhac.—The new steam yacht, *Leon Pauilhac*, 307 tons Y.M., built, by Ramage & Ferguson, Limited, to the order of Mons. G. Pauilhac, Toulouse, from the designs of Mr. St. Claire J. Byrne, Liverpool, has just completed her steam trials, the very satisfactory speed of 13½ knots on the measured mile being obtained. During the trials the machinery worked without a hitch, and the speed obtained was in excess of that guaranteed. The yacht is expected to leave on her first cruise in a few days, with the owner and party on board, their port of destination being Bordeaux.

Sorata.—The steel screw cargo steamer, *Sorata*, sister ship to the *Corcovado*, has just been completed by C. S. Swan & Hunter, Limited, for the Pacific Steam Navigation Co. She passed through her official trials at sea on April 14th in a highly satisfactory manner, both as regards the ship and engines. The weather was somewhat boisterous and the wind high, yet she attained a mean speed on the Whitley measured mile of 12·54 knots when loaded to two-thirds of her deadweight cargo power, and on a long sea run of some four hours' duration she averaged 12·9 knots. The engines worked perfectly, and a full command of steam was maintained without any difficulty. The vessel is 405 ft. over all by 47 ft. 2 in. beam, by 32 ft. 9 in. depth, moulded, and has been specially designed to trade between Liverpool and the various ports of the company's Pacific route. The propelling machinery has been supplied by the Wallsend Slipway and Engineering Co., Limited, to a high-class specification furnished by the owners. The cylinders are 24 in., 40 in., and 66 in. diam. by 51 in. stroke, the working pressure being 190 lbs. per square inch. The propeller is by the Manganese Bronze Co. The Pacific Steam Navigation Co. was represented by Captain Conlan, marine superintendent, and Mr. Thomson, engineering superintendent, the shipbuilders by Mr. C. S. Swan and Mr. E. W. De Rusett, and the engine builders by Mr. Wallis.

Rugby.—Lately the *Rugby*, a large steel screw steamer which was recently launched from the shipbuilding yard of Messrs. John Priestman & Co., Sunderland, left the Wear for her trial tr p This vessel has been built for Messrs. Galbraith, Pembroke & Co. of London, and is the third vessel supplied to the same owner within two years. Her dimensions are:—336 ft. long, 47 ft. broad, and 26 ft. 10 in. moulded depth. She is designed to carry a large cargo on light draught, has a full poop, long bridge and topgallant forecastle, and is divided into watertight compartments by five steel bulkheads. A double bottom for water ballast is fitted in each hold, the after peak being used for the same purpose, the total water ballast capacity being 830 tons. The saloon, together with the accommodation for captain, &c. is tastefully fitted up in a large deckhouse on the bridge, officers' and engineers' berths being arranged in houses at sides of engine casing, and the crew under the topgallant forecastle. The engines, which are of the triple-expansion type, have been supplied by Messrs. Blair & Co., of Stockton-on-Tees, and have cylinders 24 in., 40 in. and 66 in., with a stroke of 45 in. The boilers are two in number, working at a pressure of 160 lbs. per square inch. When the vessel was run over the measured mile she attained a speed of 12 knots, which was deemed highly satisfactory, especially as a heavy sea was running at the time.

Gaika.—On April 15th the new twin screw steamer, *Gaika*, the seventh vessel built by Messrs. Harland & Wolff for the Union Steamship Co., left her moorings and proceeded down the Belfast Lough for trial trip and adjustment of compasses. The length of the *Gaika* is 430 ft. breadth, 52 ft.; and depth, 33 ft. She is over 6,000 tons register, and propelled by twin screws, driven by two sets of triple-expansion engines constructed by the builders. This steamer is the second of the three new steamers, Messrs. Harland & Wolff have had in hand for the Union Co. of a somewhat similar type to the well known "G's" also built by

them, and already running on the same service, but of considerably larger dimensions, and with unusually complete accommodation for first, second, and third class passengers. The saloon is handsomely decorated in oak and teak, the ladies' room in dark mahogany with marquetrie panels, satinwood, and other wood, the smoke-room in oak, second saloon in mahogany and satinwood, and the library is handsomely fitted up with bookcase and writing-desk, and surmounted by an elaborate dome with richly decorated glass. Complete installations of electric light and refrigerating apparatus, with cold chambers for the conveyance of fruit, are provided. In addition to another steamer, a duplicate of the *Gaika*, Messrs. Harland & Wolff have at present in hand a much larger ship for the Union Steamship Co., to be named the *Briton*, and which when completed will be the largest steamer in the South African trade. The *Gaika* is commanded by Captain Bernard Copp.

Belvidere.—On April 17th the screw steamer, *Belvidere*, recently completed by Messrs. Workman, Clark & Co., Limited, of Belfast, and owned by Messrs. R. & C. Allan, of Glasgow, ran her official trip on the Clyde. When the Cumbrae light was reached the *Belvidere* was run full speed to the Cloch light, a distance of about 13½ knots, and afterwards the measured mile at Skelmorlie was run a number of times, the mean performance recorded being 15¾ knots, this being three-quarters of a knot in excess of the speed guaranteed by the builders. During the day's running the engines were never slowed, and the entire trial trip proved a complete success. The dimensions of the new steamer are:—Length, 255 ft.; breadth, 34 ft.; depth moulded, 24 ft.; and she has been constructed both in hull and machinery to highest class of the British Corporation Registry. The vessel afterwards proceeded on a voyage to the West Indies.

Clan Macdonald.—On April 20th the new steamer, *Clan Macdonald*, built by Messrs. Wm. Doxford & Sons, Limited, for the Clan Line Steamers, Limited, of Glasgow (Messrs. Cayzer, Irvine & Co.), left the Wear for her official trial, which was successfully carried out on the measured mile, the vessel showing a speed of over 13 knots. She afterwards sailed direct for Glasgow. The owners were represented by the superintending engineer, Mr. John Lyall, of Glasgow, and the vessel was in command of Captain Harrison.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

THE STABILITY OF VESSELS.

To the Editor of The Marine Engineer.

Sir,—While having read with considerable interest what appears in your valuable paper on the question of the stability of vessels and the necessity of executive officers being taught the elementary principles underlying the question, is this not, after all, a very simple study, and one which concerns the shipbuilder and marine superintendent as much as the person who may be only temporarily placed in charge? A ship is built for a particular trade given by the buyers, and the details being settled by their representative, the plans are presumably overlooked by him. If now any mistake creeps in with the original construction the owners, in conjunction with the builders, take a joint responsibility in the matter. To say that the ordinary captain can, with his other multifarious duties, be expected to go into minute questions of stability is beside the mark. It is not that he could not understand the subject, about which there does not seem to be any particular difficulty—as is made out in some quarters—but rather that he is overburdened as a rule with work already. To what extent any simple, graphical method of illustrating tender angles of ships' heel would be useful, it is impossible to say, because it is doubtful if all the conditions could be represented by any rough-and-ready method, however good, such as you name. Does it not appear that endeavours should rather be made—by ballasting, and precautions as regards valve openings, so that accidents would be nearly or quite prevented? Generally speaking, these now arise from a few leading causes, the most important of which, perhaps, is like that which happened to the *Orotava*, due to a heel over in basin or harbour at the tender angle, and the simultaneous fatal opening in ship's side. The opening, however, is a part of the ship's construction, and if this could not have been avoided originally, it would seem to be only a question of general management on the part of whoever was handling the vessel at the time of her turning over. Such duty would imply that light out of the water and not on an even keel, all valves should be closed. Very little or no science is required here. The ship stands high up, ballast is not brought into requisition, and when the list takes place water rushes in, and the vessel does not right herself again. Surely it cannot be seriously contended that mathematics will help matters much where these simple principles only are involved? Yet that appears to be the contention at the discussion held at the Shipmasters' Society. It is generally known if a vessel is tender it is the result usually of too narrow a beam, and bringing, as you say, the line of the centre of buoyancy inside that of the centre of gravity instead of outside, with the weight all one way; but however mistaken such designs are, there may be reasons for so specially building vessels sometimes, and in those cases persons in charge should be required to take precautions accordingly. Perhaps the fact that the *Orotava* was alongside a wharf, and in apparent safety, brought with it a certain amount of carelessness, showing the weakness of the human equation at all times. Under similar circumstances, it is much to be feared there will be the same liability to occurrences of the kind again; and, knowing this to be so, it behoves owners and designers to guard against disaster of the kind by so proportioning the beam to the depth of vessels that they will not capsize so easily when unloading or taking in cargo. It will certainly, therefore, afford some evidence of the powers of shipmasters generally for comprehending this intricate subject if, in coming to a conclusion at their meetings, they are able to place the burden of such untoward mishaps rightly to the proper shoulders. As the matter stands at present, there appears to be so many different factors all sharing the responsibility, that any tangible result would certainly be welcome to the general body of shipowners and builders.

Yours, &c.,

Watchful.

London, April 20th, 1897.

Reviews.

Propeller Wheels.

From Mr. A. Wells Case, of Highland Park, Connecticut, U.S.A., we have received a pamphlet on his patent outward thrust propeller wheels. The theory upon which Mr. Case has worked has been the getting a concentration of water behind the propeller so as to give it a more solid medium against which to work. The result aimed at was first attempted to be attained by the use of a blade of peculiar shape which tended towards the rear. But experiment showed that this theory, like most propeller theories, did not work out properly in practice, and after a series of interesting experiments, which are here detailed, the inventor found that his object was to be reached by striving to give his blades an outward thrust. The volume contains a number of testimonials from scientific men and yacht-owners who have had experience in the use of propellers designed by Mr. Case, and it will be seen that they are unanimous in considering that his invention has done much towards giving us a more efficient propeller; that is, in other words, towards giving us greater efficiency in our steamships, and towards economy of coal and diminished expenses of working on the one hand, and towards greater speed for a given H.P. on the other. The importance of the subject is such that to practical men nothing further need be said. Such men will desire to investigate the matter for themselves.

The Naval Pocket-Book. By W. Laird Clowes. London: Neville Beeman, Limited. 1897.

The second issue of Mr. Laird Clowes's pocket-book is corrected down to December, 1896. But the addenda give information to a date late in that month. The idea of the first issue

has been followed out, and many errors incidental to a new work have been eliminated and several useful additions made. The amount of information now afforded in this small book is really most remarkable. The lists of warships of the world are given with a completeness not elsewhere afforded. For not only are the big and new ships enumerated, but nothing is too small or too old to be neglected. Thus we find here the names of the War Department's steamers, and of the old hulks which, though practically dead for active service, still do harbour duty as barracks, churches, jetties, store-ships, coal-hulks, drill-ships and training vessels. The details too of the chief ships are very fully expressed. Some of them are illustrated by diagrams. Each vessel has a classification letter on a system of the author's own, and thus he shows the steps by which he arrives at his tables of the comparative strengths of the various maritime Powers. If any reader dislikes the classification of any particular ship—owing to the fact that he has either a higher or a lower estimation than our author of her powers—he can correct the tables for his own benefit in the way that he considers right. Tables of comparative strengths of the chief navies in personnel are given. There are lists of the docks of the world, information as to guns and torpedoes which is of considerable interest, whilst at the end of the book some useful tables of weights and measures are given. The awakened interest in the Navy makes such a book worth producing, for the demand for such volumes is now very large outside service circles, and the fact that such information is now placed within the reach of all who take the trouble to acquire it, is a great guarantee that the intelligent interest in things naval now aroused will not be likely to fall away in the future.

Engineering, Arithmetic and Mensuration applied to the First Principles of Mechanical Science. By Charles R. Honiball. Published and sold by the Author, at 161, Fountain's Road, Liverpool. 1896. Price 2s. 9d., post free.

This is a text-book designed for the use of young engineers and mechanics attending preparatory classes. The author is from his position in an engineering business at Liverpool, and as a teacher to working engineers and artisans in the scientific and technological classes, well able to deal with the subject on which he writes. He divides his book into three parts, the first dealing with the question of arithmetic, the second with mensuration, and the last with physical science. The rules and explanations are very clearly given, and the whole volume is full of examples and exercises of a kind which the author must have encountered, both in his daily work and in his capacity as teacher. The form of the examples and exercises seems to us to lend them additional value, for they may in themselves supply information to the student, whilst the fact that they are so intimately connected with the learner's daily work and interests tends to awaken and keep alive his curiosity and intelligence. We may add that answers to all the exercises are to be found in an appendix. The explanation of the mechanical and physical questions are all very clear, and should be intelligible to all students, even when working alone. The volume will certainly prove most useful to those who are endeavouring to prepare themselves for examinations, and to advance themselves in the engineering and kindred trades. Though the book is small it contains a vast amount of information, thanks both to the conciseness of the author's style, to which we have already alluded, and also to the thinness of the paper on which it is printed.

The International Annual of Anthony's Photographic Bulletin and American Process Year Book for 1897. New York: E. and H. T. Anthony; London: Percy Lund & Co., 1897.

This is the ninth issue of this very popular and useful annual. It surpasses itself this year in the beauty of its reproductions, and in the artistic choice of its subjects for illustration. The letterpress is well fitted for the companionship in which it finds itself. There are numerous articles on points which present difficulty in photographic practice. Here ways out of the trouble are suggested. There are other articles recommending certain inventions and methods which may be relied on to save labour, and to attain improved results. With these there are also suggestions as to how good pictures may be obtained from faulty negatives or bad plates. And, perhaps most interesting to the general reader, there are suggestions as to photographic tours in this lovely old country where we are content to work, but which we always seem to wish to leave at holiday time, regardless of the fact that it is packed with beauty and teeming with association. Now that everyone uses a cycle, and most people are amateur photographers of a more or less serious kind, the photographing tour ought to become more and more popular. There is no reason now why a large area should not be included in a brief holiday, and the cycle lends itself with ease to the carriage of photographic impedimenta. Half the pleasure of seeing what is of beauty and of interest consists in the carrying away of some memorial of what one has seen. Now there should be no difficulty in possessing perfect and enduring reproductions. We can heartily recommend this volume.

Navigation, Practical and Theoretical. By D. Wilson Barker and William Allingnam. London: Chas, Griffin & Co. 1896.

This is one of the useful Nautical series. The choice of such an experienced sailor as Captain Wilson Barker for the work of writing this, one of the most important volumes of the series, was very happy. For Captain Barker, as most of our readers know, is not only a practical sailor, but he is also well acquainted with the best methods of imparting instruction, and he is therefore well qualified for the task he has undertaken. His book therefore steers clear of the too common error of those who are not in the habit of teaching. There is no working over the reader's heads. There is no chance for the student to say that he cannot use the work without assistance, because points are left unexplained. The study is commenced at the very beginning. A copious chapter of definitions is succeeded by one which teaches the use of the instruments of navigation. Then comes one on the correction of courses, for it is useless to discuss the methods of plane, traverse or circle sailing till the student has seen how to make good the course he is set. The seventh chapter deals fully and concisely with all that is included in that comprehensive expression, "A day's work." This chapter is amplified with illustrations and examples. The work of discovering the position by bearings has its chapter, and the Mercator chart and its application and use are also gone into. A number of examination papers enable the student to test his progress, and to find out how he will be likely to come out of his contest with the examiners. The little volume is a model of conciseness, and is very likely to prove useful to young deck officers.

Peck's Export Index. Edited by W. J. Davis. New York, 1897.

This volume is one of the direct products of the American's desire to come straight to the point in business, and to try and do as much as a couple of old-world commercial men in an equal time, and to do it as thoroughly as they could. The only way in which such a result can be attained by anyone is by having the most perfect system and appliances possible. Thus we find that American desks and files, and suchlike office requisites, are always most convenient and time-saving to British business men. Peck's "Export Index" is an attempt to give the same facilities for saving time in reference, which others have already given in more peculiarly mechanical matters, to those of us who live on this side of the Atlantic. Briefly this is a huge catalogue of the manufacturers and exporters of American goods, with terms and illustrations. This list comprises nearly everything that can be made. Amongst them we notice, of course, such American specialities as bicycles and their appliances; furniture, with especial reference to the requirements of the medical man and the dentist, and the thousand-and-one little ingenuities for which Americans are famous. But this is not merely a catalogue with an index. It is part of a system whereby anyone who uses it is enabled to find several makers of any requirement and to make a selection. He can then communicate with the firm he has chosen, telling them of his requirements, and of the fact that he has sent an order to them through his agent in the States. Thus the possibility of any error being made by the forwarding house is obviated, a certain amount of time is saved, and the buyer is put in the way of getting catalogues of the class of goods he requires direct for the future. This book will certainly prove a great convenience to those who are engaged in the import of American manufacturers.

Transactions of the Hull and District Institution of Engineers and Naval Architects. Edited by the Hon. Secretary, Mr. G. H. Strong. Vol. X. 1896.

In our review of the ninth volume of these Transactions we referred to the paper entitled Notes on Hull Steam Shipping, by

Mr. F. H. Pearson, the President of the Institution. In that volume he traced the history from the beginning of steam navigation down to the year 1840. In the present volume he covers the development of the following decade. There is a vast amount of interesting fact and material here collected with much labour. The notes themselves are, as their nature causes them to be, somewhat discursive, but the tables which are appended give the information in a very complete form. This paper, with its predecessor, will be a most valuable mine to the future historian of steam navigation.

Mr. Alfred H. Gibbings has an interesting paper on the subject of electricity on board ship, and its application to the driving of auxiliary machinery. He dwells on the fact that the bad work sent afloat by early contractors did much to discredit its introduction, and to retard its general adoption. He points out the advantages which electrically driven plant has over those which are worked directly by steam. These, he considers, to comprise greater control in stopping, starting and reversing, the absence of leaky cocks, joints and stuffing-boxes, reduced noise —which is a great consideration in passenger ships—and a saving in fuel and in space. Then he points out the superior recommendations which cables enjoy over steam pipes. It was, however, stated subsequently in the discussion on the paper that, at present, at least, the cost of electrically-driven machinery is very much against it. It was also elicited that where there are many auxiliary machines and electric light as well—as would be the case in most vessels where the principle was adopted—the greatest economy in working is effected by generating the power from several small engines and dynamos rather than from one large one. Not only is economy in working thus obtained, but the chances of a complete breakdown are rendered more remote. On subjects a little outside the actual view of the society were papers on the signalling appliances on the Hull and Barnsley Railway, by Mr. R. Pawley, and on the Instruments and Methods of Navigation, by Mr. A. M. Somerscales. The reading of papers on subjects of this kind seem to us to be far from the least valuable part of the work of such an institution, for they bring in fresh ideas which may easily suggest some improvement or adaptation in the work upon which the bulk of the members of the society are engaged.

The Gas and Electric Lighting Companies' Directory and Statistics. 1896. *The Water Companies' Directory and Statistics.* 1896. London: Hazell, Watson & Viney, Limited. 1896.

The present is the twentieth issue of these useful publications, which, as we remarked in our last year's notice, can be obtained either separately or bound in one volume, to suit purchasers' convenience. The improvement of 1896 is the addition of general indices of officials to both the lighting and water sections, and this is a matter that will very largely add to the value of the work. There are also considerable additions to the companies included in the work, the foreign, and especially the American and Canadian sections, being rendered much more complete than heretofore. The section which treats of electric lighting companies seems year by year to be increasing in bulk. The good people of Surrey (not Middlesex, as the directory gives it), however, appear in a very poor light in this regard. For we read under the heading of Weybridge Electric Supply Co., Limited, that "owing to the action of the Urban District Council in not renewing the contract for street lighting, the works were closed on September 29th, 1895." This is a very retrogressive move and we should like to have further information on the matter. The water companies section is preceded by a very interesting summary of information as to invention and supply in regard to water supply during the years 1895-96. No invention of importance in connection with waterworks has to be recorded, but there is a good deal of interesting information with regard to supply. The provincial Municipal Corporations seem, one and all, impressed with their duty to provide full means of providing water both to the present and future inhabitants of their districts. They seem to be doing all they can to get control of their local waterworks, where they have not already done so, and to foresee the demands which the growth of population will in the future make upon them. With London it is otherwise. But whether the fault lie in London with the waterworks or with the municipality, is a very open question, and we will not enter upon it here. Suffice it to say, that the present issue of the directories will prove as useful as, or even, through the additions we have mentioned, more useful than its predecessors, and we are glad once more to recommend it to the notice of our readers.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from February 10th to April 6th, 1897.

3228 A. C. Caines. Extinguishing fire in vessels.
3265 A. E. L. Chorlton. Steam engines.
3272 G. W. Knowles. Manhole cover.
3354 W. Beesley. Steam boilers.
3356 J. E. L. Ogden. Feed-water heaters.
3358 J. Hailwood. Metallic-faced packings.
3388 M. Hunter. Separating material in ships.
3392 J. E. Bott and G. H. Morrison. Ship fittings.
3411 B. W. Taylor. Utilising exhaust steam of boiler furnaces.
3412 R. G. Shapcott and H. E. Brown. Combustion of fuel.
3433 H. H. Lake (E. B. Parkhurst, United States.) Furnaces.
3455 G. Beesley. Boiler furnaces.
3457 J. Struben. Feed-water heaters and purifiers.
3466 J. E. L. Ogden. Tubes for tubulous boilers.
3480 J. Cleave. Boilers.
3484 E. N. O. R. Ropner, jun. Cargo-carrying vessels.
3455 G. J. Ayling. Rudders.
3576 J. C. Mewburn (J. C. Taylor, Grand Canary). Anti-fouling compositions.
3589 F. Eisler. Furnaces.
3610 W. J. H. Jones. Lubricators.
3615 W. & A. R. Crawford. Working watertight doors.
3627 J. Whiteley. Condensing steam.
3649 C. Burrell, jun., and W. C. Wilson. Steam boilers.
3663 J. M. Ramsay. Ships' rudders.
3668 E. T. Carter. Internal combustion engines.
3719 A. J. Pardy. Trawl nets.
3724 W. Brothers. Steam boiler furnaces.
3728 A. J. Boult. (L. Dulac, France). Ships.
3732 G. R. Purdy. "Boards" for trawl nets.
3734 E. F. W. Agatz. Cleaning surface of ships.
3741 J. Cotter. Oars.
3753 J. Hannan. Method of driving capstans.
3755 F. E. Rainey. Water-tube boilers.
3781 F. W. Wheadon. Purifying of feed-water.
3827 I. Chiera and C. Gabellini. Marine construction.
3840 C. Werdt and E. Sauer. Securing ships' boats.
3974 W. H. Dodds. Trawl nets.
3979 E. W. and S. P. Fraser. Boilers.
3993 F. W. Webb. Piston valves.
4001 H. N. Bickerton. Lubricators.
4027 P. A. Mears and L. Hirsch. Covering ships' bottoms.
4059 L. Rellstab. Ships' compasses.
4072 E. Dagnall. Engines.
4094 F. Buhnemann. Sailing boat.
4095 H. Howell. Valves.
4163 F. J. Hadfield. Valves.
4187 C. A. Allison. (E. F. Edgar, United States.) Boilers.
4230 G. C. Marks. (J. Paimpercy, France.) Boat.
4240 J. R. Robson. Vertical steam boilers.
4322 J. Thomas. Water gauges.
4371 A. M. Lang. Feed-water heater.
4414 T. Scott and C. Salmon. Boiler-tubes.
4444 G. C. Marks. (Count Eugenio Piatti del Pozzo, France.) Submarine vessels.
4475 A. d'Abren. (J. Peters, France.) Valves for steam generators.
4529 T. Sadron. Trawling apparatus.
4561 W. P. Thompson. (T. F. Fairlie,—.) Boiler furnaces.
4588 J. I. Booker. Boiler flues.
4611 F. B. Bramham and A. J. Crippin. Boiler.
4668 N. Foley and F. Furse. Water-tube boilers.
4743 D. Adorjan. Boilers.
4751 A. R. Leask. Steering signals for ships.

4783 A. Rigg and J. F. Walters. Cylinder engines.
4925 G. Kingdon and Simpson, Strickland & Co., Limited. Valves.
4932 G. H. Jones. Protecting ships in warfare.
4947 W. Peel. Composition for ships' bottoms.
5045 F. Berdal and V. Ducoulombier. Preventing incrustation of boilers.
5086 W. M. Tucker. Propulsion of steam vessels.
5152 J. S. Raworth. Valve steam engines.
5185 J. McFarlane. Water-heating boilers.
5218 N. de Naeyer. Water-tube steam generators.
5243 J. Phillips. Anchors.
5264 E. Melcher. Boats.
5269 H. Munro. Valves.
5302 J. T. Haddock. Lubricators.
5354 H. H. Lake. (E. Angelot, France.) Propelling ships.
5394 P. Neu. Rotating piston for steam engines.
5430 J. T. Marshall. Speed-regulating governors.
5433 E. Dagnall. Engines.
5440 P. A. Waller. Dry wells for submarine work.
5491 G. Engel. Steam boilers.
5501 R. H. Radford. Steam generators.
5504 S. N. Nixon. Rudder fittings.
5505 W. W. Beaumont and H. P. Holt. Steam generators.
5507 H. W. Sullivan. Signalling between ships without wires.
5526 E. J. Clubbe, A. W. Southey, and the Electric Motive Power Co., Limited. Internal combustion engines.
5549 T. A. Vaughton. Lubricators.
5625 W. Kuss. Steering ships.
5626 H. D. Fitzpatrick. (J. W. McKinnon, United States.) Ships' davits.
5638 J. Griffin. Releasing ships' boats.
5663 J. T. Trench. Valves.
5670 B. H. Thwaite and H. V. Holden. Armour plates.
5673 J. R. Ellicott. Torpedo net defence booms.
5675 E. Bond. Covers for ships' hatches.
5681 E. S. Campbell. Governing marine engines.
5685 W. Scrimgeour. (E. H. Ricken, United States.) Boilers.
5721 F. L. Martineau, F. and E. Phillips. Steam generators.
5780 J. E. Gibbs. Apparatus for propelling boats.
5782 C. and F. Drakard. Boards of trawl nets.
5787 W. H. Fitzgerald. Boats.
5879 G. W. Mallet. Ships' anti-fouling scrubber.
5908 W. Schmidt. Superheating steam.
5941 J. Hunter. Armour plates for ships.
5943 R. Richardson. Ships' steering gear.
6013 J. T. Marshall. Metallic pistons.
6115 A. S. E. Ackermann. Propulsion of boats.
6118 W. M. Smith. Steam generators.
6119 W. M. Burnett and W. C. Martin. Boats' chocks.
6134 G. Chapman and J. McL. Finlayson. Propellers.
6158 L. Maiche. Steam boiler feed apparatus.
6186 A. J. Henderson. Pumps.
6201 J. Glover. Blades of screw propellers.
6206 W. P. Thompson. (H. Brinkmann, Germany.) Thrust bearings for shafts.
6293 E. S. Higgins, H. A. Bessemer, and W. B. Nicholson Steam generator
6322 A. H. Brintnell. Bow-facing oars.
6336 E. T. Carter. Internal combustion engines.
6342 F. Lamplough. Steam generators and engines.
6402 A. Dalmer. Rowlocks and oars for boats.
6406 F. J. Sweeting. Bulwark wash ports for ships.
6412 J. Bray. Water gauges for boilers
6419 H. W. Mackenzie. Friction clutches.
6454 H. E. Bowring. Anchors.
6455 G. Azzeroni. Ships' propellers.
6476 J. A., F. E., and M. E. Normand. Steam generators.
6539 J. L. Ceuvel. Closing watertight doors.
6566 E. Pellas and S. Fossati. Thrust bearings.
6578 H. J. Fraser. Steam boilers.
6603 H. Wilcke. Water-tube steam generators.
6607 F. L. Martineau, and F. and E. Phillips. Steam engines.
6608 C. Redlich. Submarine chambers.
6624 A. Priest. Valve action.
6651 J. R. Hargreaves. Internal combustion engines.
6689 T. Myers. Two-throw crank shafts.
6696 W. S. Simpson. Armour plates.
6699 H. Hallworth. Cylinders.
6753 F. R. Simms. Governing steam engines.
6770 E. E. Dulier. Lubricating ships' bottoms.
6771 E. E. Dulier. Floating batteries.
6776 J. H. Clasper. Rowlocks.
6784 J. Werth. Armour plates.
6836 C. Bender and C. G. S. Mueller. Anti-friction bearings.
6841 A. G. Burrell. Transhipping sand ballast.
6842 J. S. Eddy. Steering device for torpedoes.
6845 G. Niemeyer and G. F. Schröder. Steam generators.
6886 J. Vavasseur. Armour-piercing projectiles.
6892 D. McLachlan. Sheaves for pulley blocks.
6990 J. Pitman. Life-saving floating saloon.
7025 M. Crawford. Steam generators
7049 W. H. and R. W. Allen. Valves for generators.
7053 E. A. Gill. Leeboard gear for sailing craft.
7083 W. A. P. Werner. Steam generators.

BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

March 27th, 1897.

Adamson, F. F. 1C S'nd'land
Black, T. H. .. 1C London
Chapman, J. W. 2C S'nd'land
Coltman, E..... 2C N.Shields
Daniel, A. W. E. 2C London
Davison, J. .... 1C N.Shields
Dawson, T. .... 2C ,,
Eastes, R. H. .. 2C ,,
Foote, E. ..... 2C Aberdeen
Forrest, A. .... 2C S'nd'land
Gardner, Alex. . 1C Liverpool
Hale, F. A. P... 1C London
Hall, J..... 2C N.Shields
Hogg, H. ..... 1C London
Hudson, T. E. . 1C S'nd'land
Jannings, F. .. 2C London
Langley, H..... 2C Liverpool
McDowall, H.G. 2C London
Murray, J. .... 2C Aberdeen
Porter, J. ..... 1C N.Shields
Robertson, J. .. 2C ,,
Robinson, H. P. 1C S'nd'land
Ross, A. ..... 2C N.Shields
Stevens, H. C. J. 1C London
Stokie, J B. .. 1C S'nd'land
Thearle H. .... 1C Liverpool
Thompson, H.W 2C London
Tough, W. .... 2C Aberdeen
Tully, T. H. .. 1C S'nd'land
Twiss, W. J. .. 1C London
Watson, J. .... 2C S'nd'land
Wilson, E. .... 1C N.Shields

April 3rd, 1897.

Arrowsmith, S.E. 1C N.Shields
Brock, A. ..... 1C Glasgow
Burns, J. F..... 1C N.Shields
Cables, A. W. .. 1C Cardiff
Crawford, J. .. 1C Glasgow
Cullen, J. W. .. 2C ,,
Deane, W. A. .. 2C ,,
Dingle, P. E. .. 2C London
Duff, R. ..... 2C Glasgow
Dunlop, H. A... 1C London
Dunning, John . 2C Liverpool
Ellison, Thos. . 1C ,,
Flower, J. S. .. 2C London
Geen, G. H. .. 1C Cardiff
Hyndman, T. .. 2C London
Johnson, W. R. 1C N.Shields
Jones, Ellis .... 2C Liverpool
Kidd, John .... 2C ,,
Lefeaux, A. W. 2C London
Lewis, J. ..... 1C ,,
Logan, R. ... 1C ,,
Machin, S. L.. 1C Cardiff
Maltman, D. .. 1C Glasgow
May, F. ..... 1C London
McDonald, Chas. 1C Liverpool
McLeod, L. .... 2C Glasgow
Moore, W. T. .. 2C London
Parkih, T. M... 2C Cardiff
Parsons, W. S. . 2C London
Prichard. D. .. 2C Cardiff
Procter, H. R... 2C ,,
Robson, T. .... 1C N.Shields
Scott, W. ..... 1C London
Small, W. J. .. 2C ,,
Stinis, D. P. .. 2C ,,
Thompson, J.W. 1C Liverpool
Wake, G. C. ... 2C N.Shields
Webster, H. B. . 1C Glasgow
Wilkie, G. D. .. 2C N.Shields
Woods, T. .... 2C London

April 10th, 1897.

Beveridge, A. .. 1C Leith
Borthwick, G. . 2C ,,
Corlett, A. R... 1C Liverpool
Duncan, R. N. . 2C London
Graham, W. A. 2C ,,
Owens, A. E. .. 2C Liverpool
Owens, Robert . 1C ,,
Potts, J. W..... 2C N.Shields
Prior, J. ..... 2C London
Raymond, Harry 2C Liverpool
Sibbald, John .. 1C ,,
Skakle, J. G. .. 2C London
Smith, W. S. .. 2C Leith
Wilson, E. .... 2C N.Shields
Wilson, J. O. .. 2C ,,
Woodcock, J. G. 1C Leith

April 17th, 1897.

Bunker, J. T... 1C Hull
Crawford, J. C. 2C Liverpool
Donaldson, J... 1C Hull
Hanbon, J. .... 2C Liverpool
Hardie, A. Mc.P. 1C Greenock
Higgins, J. .... 1C ,,
Hoy, W. M. .... 1C ,,
Jones, T. ..... 1C Dublin
Kennedy, J. H. 2C Greenock
Lindsay, J. W. 1C N.Shields
Mackenzie, J. .. 2C Greenock
McMaster, D. C. 2C Dublin
McMaster, D.W. 2C Greenock
Melville, M..... 2C N.Shields
Moncrieff, A. .. 1C Greenock
Paxton, A. S. .. 2C ,,
Ray, J. ..... 1C N.Shields
Spencer, T. .... 1C Liverpool
Stanger, D. C... 1C Greenock
Waugh, T. .... 2C ,,
Williams, W. .. 2C Liverpool
Williamson, J. . 1C Greenock
Wyper, T. .... 2C ,,

The Marine Engineer.

LONDON, JUNE 1, 1897.

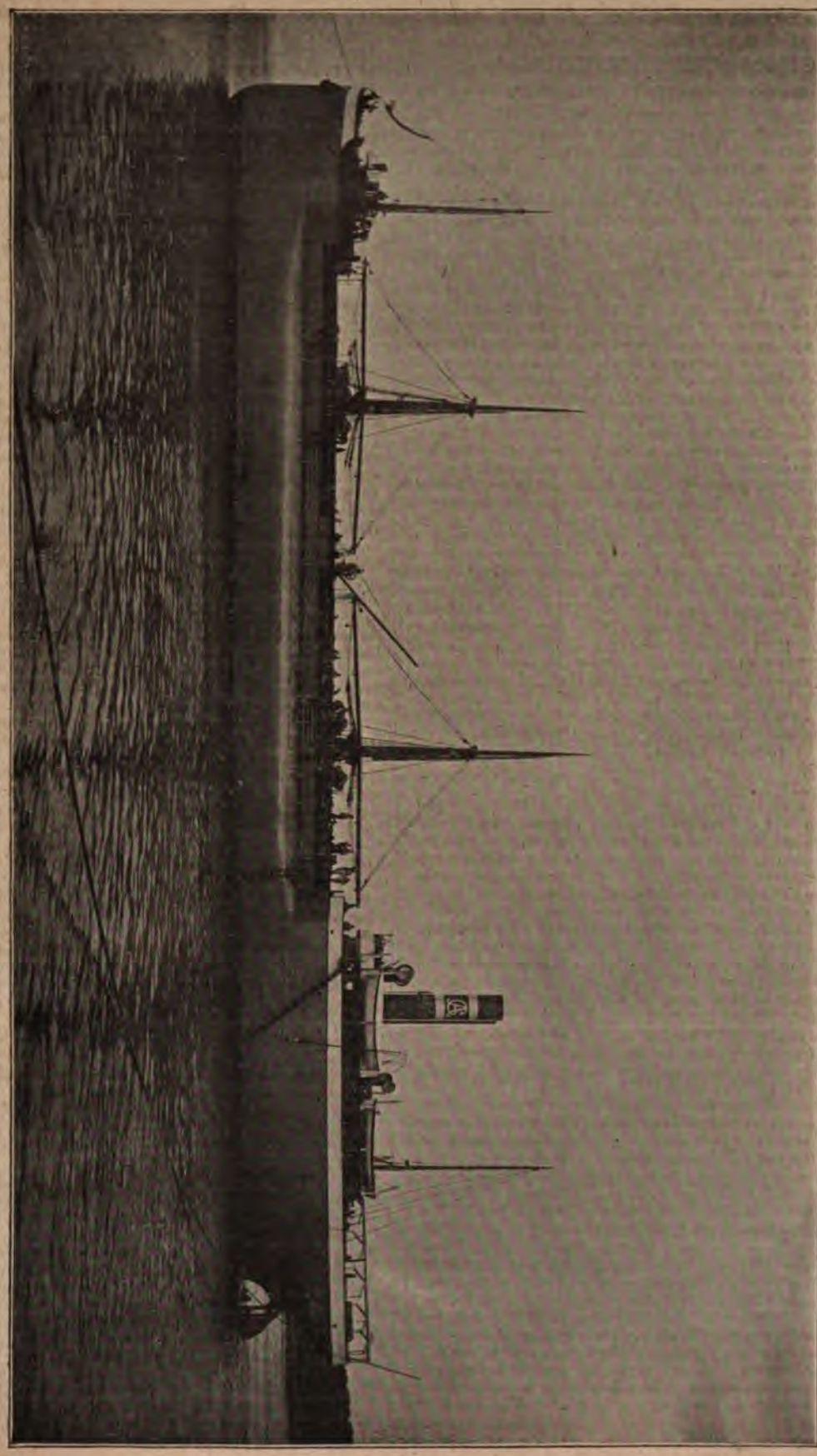
EDWARD P. MARTIN, Esq., in his presidential address to the Iron and Steel Institute, has carefully compiled and laid before his hearers most valuable statistics of the iron and steel industries of this country, pointing out the steps of continued progress in the production of manufactured iron and steel, that have maintained the flourishing output of this important industry, whilst at the same time he points out the vast strides made by competing manufacturers in foreign countries, and warns everybody interested in the trade that there must be no flagging in their endeavours to keep Great Britain abreast with modern methods and improvements. The comparison given of first records of pig-iron per furnace in 1791, at Dowlais, which was only 20 tons of pig-iron per week per furnace, at an expenditure of 8 tons 1 cwt. per ton of pig-iron, is most interesting as compared with the present production of 1,600 tons per week per furnace, with a consumption of only 19 cwt. of coke, equal to about 1½ tons of coal per ton of pigs. But this again pales before the latest production in America, from the Duquesne furnaces, whose best week's work exceed 4,000 tons from each furnace, with 1,700 lbs. of coke per ton of pig. And it is said that furnaces of a still further improved construction are in the course of erection in the States, of which the production is expected to be as much as 1,000 tons per furnace per day. It behoves, therefore, our iron-masters to look well to such improvements, and not to allow themselves to be distanced. The introduction of the Bessemer and Siemens steel processes of course revolutionized the large works of the old iron-masters, and the tendency ever since has been for the better and stronger material to replace iron in all structures and boilers. The Bessemer and Siemens processes, requiring pure hematite iron for a satisfactory product, developed an enormous carrying trade at sea in the delivery of such ores from Spain, the Mediterranean and Scandinavian districts, and it was not until the introduction of the Thomas-Gilchrist process for dephosphorizing impure ores, that the locally produced ores could compete with the water-borne foreign supply for steel production. Had it not been for the enormous reduction in sea-borne freights in the last few years, it is probable that this process, enabling the ores from the Cleveland, Northamptonshire, Lincolnshire, Staffordshire, and North Wales districts to be utilized for basic steel making, these cheap ores would probably have completely cut out the hematites from the steel market. However, the shipowners have proved equal to the emergency, and have kept the sea-borne supply alive by a reduction from about 16s. a ton to 4s. 9d. However, the German and French iron-masters in the Minette ore districts have found a great advantage from the Thomas-Gilchrist process in enabling them to place their cheap abundant phosphoric ores on the market as basic steel. It is now the turn of the Railway companies to look well to the question of freights for heavy mineral goods, to reduce the same where possible, and to consider and carry out all means of reducing the "tare" of carriage, by largely increasing the capacity of their mineral trucks to enable our iron-masters to compete against foreign rivals in the markets of the world. In hydraulic forging of large shafts great improvements have lately been made in the facility for working enormous masses, and in the homogeneity of the finished product right down to the core. Messrs. John Brown & Co. have been the leaders amongst us in adopting enormous hydraulic presses up to 5,000 tons, with a distance of 18 ft. from column to column, but Mr. Krupp, of Essen, is not behind them in such enterprise, and an ingot of high class steel weighing 70 tons can be handled by them with the greatest ease.

IT is well sometimes, in any art or profession, to stop and have a retrospect of what has been accomplished in the course of time, and to note the various stages of development and advance. It was presumably with this view that Mr. M.W. Aisbitt communicated to the Institute of Marine Engineers an interesting paper upon "Shipbuilding, Ancient and Modern." As Mr. Aisbitt points out, the science of naval architecture, depending as it does so much on individual requirements, was until these latter years a profession in which each man was a law unto himself, and apparently Noah, to go back to earliest records, was an able designer, and knew, or at any rate employed general dimensions in his design of the Ark, which would have done no discredit to naval architects of the present day, after all their experience, and the effort and success in the building of such an enormous floating scow or caravanserai must have been as creditable in its way and as far ahead of its times as the building of the *Great Eastern* was for Brunell and Scott Russell. It would appear from the collated testimony of Holy Writ and Josephus, that the dimensions of the Ark were a length of 540 ft. by a breadth of 90, with a depth of 54, which would probably give it a draught, when laden, of about 27 ft. These proportions are very much those of the best present sailing ship models, and her displacement

would have been about 22,494 tons, which was an enormous undertaking in those days, enabling her to probably carry about 12,000 to 13,000 tons of effective cargo. She does not appear to have been propelled by oars or sails, but to have been a three-decked hulk, probably closed over the upper deck and floating at the mercy of the currents and winds. The next class of boats of which there is any record appears to have been open-decked galleys, such as were used by the Vikings and Romans, and these were propelled by either oars or sails, giving ample space for oarsmen and fighting men, and of shallow draught. In about the fifteenth century we find records of the first ocean-going sailing vessels, such as the *Santa Maria*, in which Christopher Columbus discovered America, and the vessels of Drake, Raleigh, Frobisher, and Hawkins, which, though mere cockle-shells from the modern point of view, were sound sea boats enough to circumnavigate the world. Thus vessels, built primarily for mercantile purposes, were short and handy without excessive top hamper of lofty forecastles and poops, which were the peculiarities combined with great length and burden of the warships of the Armada, and caused them to be so unwieldy and to suffer so greatly from the attacks of the more nimble British vessels. Captain Cook, as the result of his voyages round the world, wrote a complete history of the difficulties he had to encounter, and the nature of the vessel he thought most suitable for the trade. He defined the requirements as follows:—"One which in case of need could, through her moderate draught, be laid on the beach of any of the South Sea Islands and repaired, and enter the shallow harbours of those islands; secondly, one that owing to her comparatively large capacity internally would be able to carry a considerable cargo of light produce, and accommodate the number of men requisite for the expedition; thirdly, one which, by being able to beat off a lee shore, would be a thoroughly seaworthy and able vessel in case of storms." Captain Cook evidently appreciated the value of a high platform and utilised what were considered high bulwarks to deck the same over and fit his vessel with open rails so that a heavy sea breaking over her would easily leave her. The same idea is now seen in the case of the turret and trunk steamers. The French, at the end of the seventeenth century, seem to have been able to give British shipbuilders a good number of wrinkles in the beautiful lines of their frigates, as it is well known that many of our most beautiful models of those days were captured from the French. About 1850 the Americans took up shipbuilding in earnest, wood and labour being at that time cheap and plentiful with them, and being free from pre-conceived ideas, started new types of light hulls, and therefore large carrying capacity for their weight, and of a form of under hull calculated to enable their clippers to skim over the seas rather than to sail through them, and very successful they were. Their lines were followed by the Aberdeen shipbuilders in their Aberdeen clippers, and the Americans seem to have been the first to adopt wire rigging and large blocks and other appliances to enable more work to be done by less hands. The American Civil War and the introduction of iron into shipbuilding, gave the blow to American shipping. About the year 1860 iron sailing and steam ships became a necessity, and a full form forward and a fine after body, or a cod head and a mackerel tail, were the approved models. Though this form is excellent for coasting voyages the American and Aberdeen clippers with straighter lines were more successful in long voyages in the trade winds. In paddle and screw tugs there are many points of relative peculiarity that have to be specifically regarded to make successful tugs. The paddle tug, when light, should always run by the head six or seven inches more than by the stern, so that the towing strain should bring her to an even keel. In the screw tug the opposite should be the case. The latest novel types of ocean cargo steamers are the whale-backed steamer, the turret, the trunk, and semi-trunk steamers. The whale-back comes from the Canadian lakes, where the type was conceived for carrying grain, but the type has not been received with favour for ocean work. In the discussion upon Mr. Aisbitt's paper, which was lengthy and somewhat humorous in tone, exception was taken to the omission of the *Great Eastern* as a remarkable achievement of her time, and of the latest modern novelty, the *Turbinia*, whose record speed, marvellous for her size, is produced by the Hon. Parson's steam turbine engines, which we have already noticed.

CARGO STEAMER "EKLIPTIKA."

WE have pleasure in giving in this issue a page illustration of a new type of cargo steamer built on Mr. Alfred Christensen's Patent (oval shape), by the Flensburg Shipbuilding Co., for Mr. Alfred Christensen Steamship Co. "Urania" in Copenhagen. Her dimensions are 301 ft. by 39 ft. by 23 ft. 6 in., and she is fitted aft with triple-expansion engines of 900 H.P., leaving in the centre of ship a very large cargo space, which is perfectly self-trimming. The trial trip was run on the 6th ult., and proved a great success, the average speed being 11½ knots at a very low consumption of coal. This type was awarded a gold medal at the Lubeck Exhibition in 1895.



Mr. Alfred Christensen's Patent Cargo Steamer "Ekliptika," Built by the Flensburg Shipbuilding Co., Flensburg.

THE APPLICATION OF THE COMPOUND STEAM TURBINE TO THE PURPOSE OF MARINE PROPULSION.*

By the Hon. CHARLES PARSONS.

IT has been suggested by Sir W. H. White that a paper giving some account of the application of the compound steam turbine to the purposes of marine propulsion, might be of interest to the members of this Institution.

The date of this paper is perhaps somewhat premature, as the *Turbinia*, the first boat fitted with turbine engines, has not as yet completed her experimental trials, but as the results so far ascertained are in some respects remarkable, this perhaps may afford some excuse for their publication.

The manufacture of the compound steam turbine was first commenced in the year 1885 with the construction of small engines for the driving of dynamos; successive improvements were made, and larger engines constructed, but up to the year 1892, the consumption of steam was not such as to justify the application of this class of engine to the purpose of marine propulsion, though on account of its light weight, small size, and high speed of revolution, it presented great advantages over ordinary engines for certain classes of work.

In the year 1892, however, a highly developed compound turbine, adapted for condensing, was constructed for the Cambridge Electric Supply Co., and when tested by Professor Ewing, F.R.S., showed a consumption of steam equivalent to 15·1 lbs. per I.H.P. per hour, the boiler pressure being 100 lbs., and the steam superheated to 127 deg. F. above the point of saturation.

More recently, compound turbine engines have been constructed up to 900 H.P., both condensing and non-condensing, and consumptions of steam as low as 14 lbs. per I.H.P. with saturated steam, and 100 lbs. boiler pressure, have been ascertained in engines of 200 H.P., and still lower consumptions in engines of larger size. Many of the original engines are still doing good work: some, especially the larger sizes of 500 H.P. and upwards, are frequently kept at work for several weeks without stopping. The returns of the Newcastle and District Electric Lighting Co. show a yearly cost of upkeep of 2½ per cent. per annum, and the total H.P. of turbines now at work in England exceeds 30,000 H.P.

In January, 1894, a syndicate was formed to test thoroughly the application of the compound steam turbine to marine propulsion, and a boat was designed for this purpose. In view of the large amount of alteration that would probably be required before a satisfactory issue was reached, and the large amount of time and expense necessarily involved, it was decided to keep the dimensions as small as possible, but not so small as to preclude the possibility of reaching an unprecedented rate of speed, should all the parts work as satisfactory as was anticipated.

The fulfilment of these anticipations was, however, much delayed, and almost frustrated, by a difficulty which, though foreseen, proved to be of a much more serious character than was anticipated. This difficulty was that termed by Mr. R. E. Froude "The cavitation of water," or, in other words, the hollowing out of vacuous spaces by the blade of the screw, and this pitfall for the designers of screws for very fast vessels, though indicated by theory to exist, came upon us in the case of our very fast running screw, taxed beyond the usual extent, in its most aggravated form. When the boat and machinery were designed, the trials of the *Daring*, which first drew attention to this difficulty, had not taken place.

The *Turbinia*—as the boat is named—is 100 ft. in length, 9 ft. beam, and 44½ tons displacement. The original turbine engine fitted in her was designed to develop upwards of 1,500 actual H.P. at a speed of 2,500 revolutions per minute. The boiler is of the water-tube type for 225 lbs. per square inch working pressure with large steam space, and large return water legs, and with a total heating surface of 1,100 square feet, and a grate surface of 42 square feet; two firing doors are provided, one at each end. The stokeholds are closed, and the draught furnished by a fan coupled directly to the engine shaft. The condenser is of large size, having 4,200 square feet of cooling surface; the circulating water is fed by scoops, which are hinged and reversible, so that a complete reversal of the flow of water can be obtained should the tubes become choked. The auxiliary machinery consists of main air pump and spare air pump, auxiliary circulating pump, main and spare feed pumps, main and spare oil pumps, also the usual bilge ejectors; the fresh-water tank and hot well contain about 250 gallons.

The hull is built of steel plate, of thickness varying from 3-16th in. in the bottom to 1-16th in. in the sides near the stern and is divided into five spaces by watertight bulkheads. The deck is of steel plate.

The approximate weights are—

Main engines	3 tons 13 cwt.
Total weight of machinery and boiler, screws and shafting, tanks, &c.	22 tons
Weight of hull complete	15 ,,
Coal and water	7½ ,,
Total displacement	44½ ,,

Trials were made with screws of various patterns, but the results were unsatisfactory, and it was apparent that a great loss of power was taking place in the screw.

To investigate the question thoroughly, a spring torsional dynamometer was constructed, and fitted between the engine and screw shaft, measuring the actual torque transmitted. The measurements conclusively proved that the cause of failure lay entirely in the screws, and, with the object of further investigating the character of this waste of power, a series of experiments were made with model two-bladed screws of 2 in. diameter, revolved in a bath of water heated to within a few degrees of the boiling point, and, in order that the model screw should produce analogous results to the real screw, it was arranged that the temperature of the water and the head of the water above the propeller, as well as the speed of revolution, should be such as to closely resemble the actual conditions and forces at work in the real screw, the object in heating the water being to obtain an increased vapour pressure from the water, so as to permit a representation of the conditions with a more moderate and convenient speed of revolution than would otherwise have been necessary.

The screw was illuminated by light from an arc lamp reflected from a revolving mirror attached to the screw shaft, which fell on it at one point only of the revolution, and by this means the shape, form, and growth of the cavities could be clearly seen and traced as if stationary. It appeared that a cavity or blister first formed a little behind the leading edge, and near the tip of the blade; then, as the speed of revolution was increased, it enlarged in all directions until, at a speed corresponding to that in the *Turbinia's* propeller, it had grown so as to cover a sector of the screw disc of 90 degrees. When the speed was still further increased, the screw, as a whole, revolved in a cylindrical cavity, from one end of which the blades scraped off layers of solid water, delivering them on to the other. In this extreme case nearly the whole energy of the screw was expended in maintaining this vacuous space. It also appeared that when the cavity had grown to be a little larger than the width of the blade, the leading edge acted like a wedge, the forward side of the edge giving negative thrust.

From these experiments it would appear that in all screws, of whatever slip ratio, there will be a limiting speed of blade, depending upon the slip ratio and the curvature of the back—in other words, on the slip ratio and thickness of blade; beyond this speed a great loss of power will occur: and that, should the speed of ships be still further increased, the adoption of somewhat larger pitch ratios than those at present usual will be found desirable.

It is not proposed here to trace further the losses of power by cavitation, but, generally speaking, the effect is felt in the case of the real ship, not in the racing of the screw, but in loss of propulsion effect.

In the model experiments, however, in hot water, the effect was both loss of propulsion effect and also racing, as would naturally be expected from the fact of greater vapour density of the water in the latter case rendering the cavities more stable.

A series of model experiments on cavitation in cold water on the lines described would be extremely interesting, and probably instructive, but would require more elaborate, powerful, and extremely high speed apparatus than was at our disposal. It would also seem that the limitation imposed on slip ratio tends in favour of larger pitch ratio for very fast vessels.

*Read at the Thirty-eighth Session of the Institution of Naval Architects.

The single compound turbine engine was now removed from the boat and replaced by three separate compound turbines, directly coupled to three screw shafts, working in series on the steam, the turbines being the high pressure, intermediate, and low pressure, and designed for a complete expansion of the steam of 100-fold, each turbine exerting approximately one-third of the whole power developed, the three new screw shafts being of reduced scantling.

By this change the power delivered to each screw shaft was reduced to one-third, while the division of the engine into three was favourable to the compactness and efficient working of the turbines. The total weight of engines and the speed of revolutions remained the same as before. The effect on the screws was to reduce their scantling, and to bring their conditions of working closer to those of ordinary practice. The thrust of the propellers is balanced by steam pressure in the motors.

The rest of the machinery remains the same, though some changes in arrangement were necessary.

The usual lignum-vitæ bearings are used for the screw shafts.

The engine cylinders lie closely to the bottom of the boat, and are bolted directly to small seatings on the frames of sufficient strength to take the thrust of the propellers. The centre of gravity of the machinery is consequently much lower than with ordinary engines.

At all speeds the boat travels with an almost complete absence of vibration, and the steady flow of steam to the motors may have some influence on priming; at any rate, no sign of this has yet occurred with ordinary Newcastle town water. No distilling apparatus has been fitted.

The boat has been run at nearly full speed in rough water, and no evidence of gyroscopic action has been observable, though such a result would be anticipated from the known small amount of these forces under actual conditions; indeed, the *Turbinia* has so far proved herself an excellent sea boat.

The oiling of the main engines is carried on automatically under a pressure of 10 lbs. per square inch by a small pump worked off the air-pump engine; a small independent duplex oil pump is also fitted as stand-by. The main engines require practically no attendance beyond the regulation of a small amount of live steam to pack the glands and keep the vacuum good.

The advantages claimed for the compound steam turbine over ordinary engines may be summarised as follows:—

1. Increased speed.
2. Increased economy of steam.
3. Increased carrying power of vessel.
4. Increased facilities for navigating shallow waters.
5. Increased stability of vessel.
6. Increased safety to machinery for war purposes.
7. Reduced weight of machinery.
8. Reduced space occupied by machinery.
9. Reduced initial cost.
10. Reduced cost of attendance on machinery.
11. Diminished cost of upkeep of machinery.
12. Largely reduced vibration.
13. Reduced size and weight of screw propellers and shafting.

APPENDIX.

Trials of the "Turbinia."

In December of last year several runs were made on the measured mile, and the maximum mean speed obtained after due allowance for tide was 29·6 knots per hour, the mean revolutions of the engines being 2,550 per minute.

Since then new propellers of increased pitch ratio have been fitted.

Further trials were made on April 1st. The mean of the two consecutive runs gave a speed of 31·01 knots per hour, the mean revolutions of the engines being 2,100 per minute, the fastest run being at the rate of 32·61 knots per hour.

The utmost H.P. required to drive the boat at the speed of 31·01 knots is 946, as calculated from experiments on her model, made at Heaton Works, on the method of the late Mr. William Froude.

Assuming the ratio of thrust H.P. to I.H.P. to be 60 per cent. (which appears to be the ascertained ratio for torpedo boats and ships of fine lines), the equivalent I.H.P. for 31·01 knots is 1,576.

The feed-water supplied to the boiler was measured by a Siemens water metre previously calibrated under the working conditions, and found to be substantially correct.

These measurements were made when running at a speed of 28 knots, and the consumption at 31·01 knots has been calculated from these measurements according to the known law between steam pressure and consumption, and by the observed steam pressures on the engines at the respective speeds. The consumption at 31·01 knots is approximately 25,000 lbs. per hour, or 15·86 lbs. per I.H.P. It should be observed that the assumption of the thrust H.P. being 60 per cent. of the I.H.P. presupposes that the propellers are of the best form attainable, and should those now fitted be superseded by others of higher efficiency, as is possible, and, indeed, probable, then the figures of consumption per I.H.P. will be correspondingly improved, and the speed of the boat increased.

The consumption of steam at 11·4 knots' speed has been measured by meter, and found to be 2,700 lbs. per hour, or equivalent to a coal consumption of about 24·6 lbs. per knot.

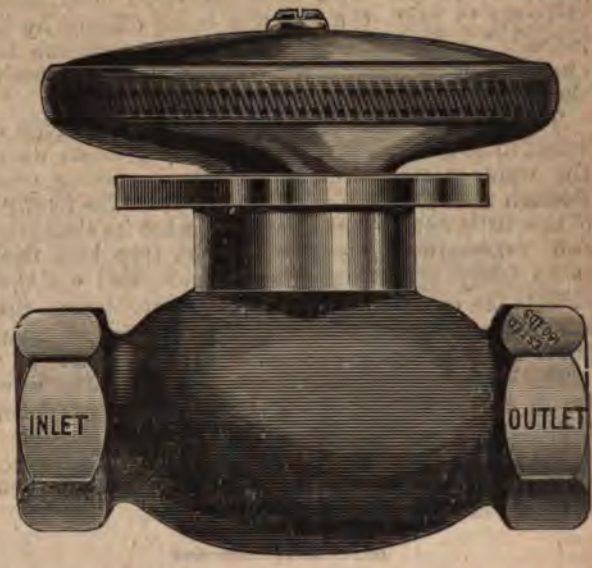
Conditions of Running of "Turbinia" at 31·01 Knots Speed.

Mean revolutions of engines, 2,100.
Steam pressure in boiler, 200 lbs.
Steam pressure at engines, 130 lbs.
Vacuum at exhaust of engines, 13½ lbs.
Speed of boat, 31·01 knots.
Calculated thrust H.P., 946.
Calculated I.H.P., 1,576.
Consumption of steam, reduced to basis of 31·01 knots, 25,000 lbs.
Consumption of steam per I.H.P. per hour, 15·86 lbs.
Total weight of machinery, including boiler, condensers, engines, auxiliaries, shafting, propellers, tanks, water in boiler, and hot well, in working order, 22 tons.
I.H.P. per ton of total machinery, 72·1 tons.

Owing to adverse weather, these trials have been much delayed, and had finally to be made under unfavourable circumstances. They are, however, believed to be substantially accurate.

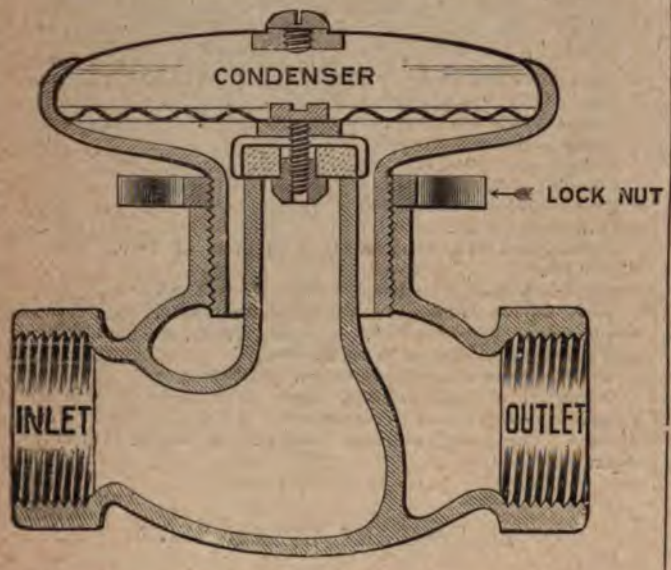
THE MIDGET STEAM TRAP.

WE illustrate in the adjoining diagrams the Midget steam trap. It will be conceded by most people that for compactness, simplicity, and comparative smallness in size, it would be impossible to find its equal in the market at the present time. As will be seen from the illustration, the device consists of a



thermostat acting on a valve. The thermostat is similar in form to the ordinary aneroid or corrugated flexible chamber, which is in this case, however, filled

with a volatile fluid and is hermetically sealed. This fluid is acted on by the heat, so that variations in the temperature produce variations in the form of the chamber, the greater the pressure within the chamber the further will its two ends be forced from one another. This chamber has attached to it the valve which co-acts with the seating in the valve casing. A mushroom-shaped casting holds the chamber, and is provided with a screwed neck which is screwed into the valve casing. This arrangement



not only serves as a means of fixture, but also as a means of adjustment, which latter when once effected can be maintained by locking the neck in place by the lock nut.

The trap is arranged when starting to allow of an uninterrupted discharge of all condensed water and deposited matter and does not close until steam attempts to pass, the function being effected by the increased temperature of the steam expanding the chamber by increasing the tension of the vapour of the volatile liquid contained therein.

The trap is connected by its inlet to the pipe or vessel to be drained in the most likely position where the water accumulates, the discharge taking place through the outlet orifice of the device. The features of this little device that appeal to us are its simplicity and compactness, which make the trap lend itself to so many applications in steamers, and will thus obviate the many objections and inconveniences that arise from the presence of condensed water in steam pipes in the various contrivances on board ship.

This device should therefore meet a genuine want for an easily fitted small-sized self-contained steam trap.

This trap is being put on the market by James Armstrong & Co., Limited, of 116, Queen Victoria Street, London, E.C.

Messrs. Yarrow & Co., Limited, of Poplar, have received a contract for the construction of four torpedo-boat destroyers, of 31 knots speed, from the Japanese Government.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Cunard Line.

It is reported that Messrs. Workman, Clark & Co., of Belfast, have arranged to take over two of the old Cunard Mediterranean boats in part payment for the three 3,000 ton vessels which they are now building for the line. The removal of the two vessels suggested would reduce their number of the oldest class to four. But their departure can not be very immediate as both vessels started on a Mediterranean voyage soon after the circulation of the report. Two of the new steamers are already in the water. The first is named *Pavia*, which is a name one knows and understands. But various papers have spelt the name of the second in four different ways, viz., as *Gyria*, *Gwyria*, *Tyria*, and *Syria*.

The old *Samaria* of this line keeps herself well before the public. There is an Admiralty suit pending in regard to the salvage services which she rendered on a recent voyage. Meanwhile she has been employed for the Government in transport work between Malta and Crete, in connection with the occupation of that island by the European Powers.

Publicationr.

The numerous new register books of merchant shipping which have sprung up in recent rivalry to Lloyd's Register, at home and abroad, seem indirectly to have been a great benefit to that part of the public which interests itself in such matters, for they have spurred on the authorities in White Lion Court to such efforts that it seems almost impossible to imagine any matters in regard to which further improvements could be made. Gradually new details have been added. First of all we had long ago the addition of particulars as to the numbers of bulkheads, the construction and material of the decks and deck erections, and the pressure carried in the boilers. Then came details of a further kind, such as the fitting of electric lighting, the particulars as to boilers, including the number of boilers, the character and number of the furnaces, the area of grates and heating surfaces. Now other particulars of an important and most useful kind are afforded. Tables of vessels fitted with refrigerating apparatus and the capacity of the insulation of each is given in appendix, as well as information as to the character of the machinery used for lowering the temperature. Other tables show the cable-laying ships of the world and the steam and sailing vessels fitted for the carriage of petroleum in bulk. In regard to this last matter I may notice that in the general list of steamers there is now an indication of the fact that the vessel is constructed to carry petroleum in bulk, and in addition, in the more recent editions of the "Register" a statement, in cases where it is known to be the case, that the machinery is aft. As far as I have been able to test it this information is very complete and exhaustive. The fact that it is issued from the Corporation in White Lion Court is a sufficient guarantee of its accuracy.

The New White Star Office,

at the bottom of James Street, Liverpool, is approaching completion, and is now sufficiently finished to afford a very good idea of what its final appearance will be. Its solidity is characteristic of the line it is to house. Its position is exceedingly good as it is detached on three sides, and has one side facing the docks with a large open space in front. It commands from its upper stories a magnificent view extending to the opposite shores of the Mersey, and on clear days even to the Welsh hills. The lower stories are built of stone and the upper ones of brick. This gives a general impression which recalls the New Scotland Yard building between the Embankment and Whitehall. This is not surprising, when we learn that the same gentleman is architect of both buildings. It is too soon to say much of the interior, except that the offices are very lofty and well lighted, and the panelling of the entrance hall with granite is already in process and promises to be very handsome and effective.

The Great Naval Review

at Spithead will be attended by some fine merchant steamers. The Cunard Company's *Campania* will occupy an important position, as the Admiralty are arranging her to follow the Royal yachts with a large detachment of legislators on board. The *Teutonic*—which occupied a place of honour at the great review at Spithead—will also be present as a representative of the auxiliary

armed cruiser of the Admiralty. She will have a party of guests on board. Then the P. & O. *Caledonia*, the Orient Line, *Ophir*, the American Line *New York* (flying the stars and stripes) and many other vessels will be present with paying visitors. It is said that the display will be the most extensive and powerful ever afforded to the public. This is how it should be, for the development of steam navigation has been one of the most remarkable characteristics of the period covered by the Record Reign.

Queenstown v. Southampton.

The Americans still cherish the belief that the Cramp-built boats are speedier than the big Cunarders. One does not wish to grudge the *S. Louis* and the *S. Paul* any merit which belongs to them and they have claims to our regard which should be enough, even for the most ambitious Americans. For they are in the first flight amongst the mail steamers of the day, although they are the first vessels of the highest class turned out in steel from United States yards. It appears that at the beginning of May the *S. Paul* arrived out 40 minutes before the *Lucania* and hence the claim is made that she is a faster ship. Yet the daily runs quoted are in themselves sufficient to disprove the claim. They appear to have been—for the *Lucania*, 104 miles to noon on the Monday, then 507, 514, 524, 505, 494, and 263 to Sandy Hook at about midnight. For the *S. Paul* the runs were—First day (which was only about twenty-two hours) 469 miles, then 482, 504, 486, 492, 495, and, on the last half day, 232 miles to Sandy Hook. The day's runs of the *Lucania* are consistently better. Moreover, if we compare the actual best day's run of each voyage, we see that the Britisher ran 524 miles in one day, whilst the best the American liner did was 504 miles. This leaves a difference in favour of the former of very nearly a knot's speed. It seems to be forgotten—or at least ignored—that the Cunarders have a delay at Queenstown whilst waiting for the mails, and that this delay enables them to bring letters written up to the close of Saturday's business in London, whilst their rivals cannot carry anything later than Friday's mails. This is a point which must be of very great value to commercial men. But it is consistently suppressed by those who maintain the protest against the notion of British bottoms for British mails.

"Fairplay"

is always amusing—even in its mistakes. Liverpool in the middle of May lost two prominent men from its public life. One was Mr. Caroe, the well-known and respected consul for Denmark. The other was Mr. Taylor, the head of the shipping department of Messrs. Papayanni's firm. *Fairplay* notes the loss of Mr. Taylor, mentions that he was with Messrs. Papayanni's, and speaks of him as "Consul for Denmark." He was nothing of the kind, Mr. Caroe was the Consul. The two men had nothing in common save the great respect in which they were held, and the fact that their deaths occurred almost simultaneously, and were both entirely unexpected. I am sorry to have to note the deaths of two well-known merchant captains. One was Captain Edward Porter, of the African Line, and the other Captain Curling. The latter was one of the old commanders of the P. & O. Company.

Of the old Holyhead Mail Boats

only one is now left. The *Munster* is reported sold to Liverpool shipbreakers. I had already mentioned the failure to run her and her sisters in the Isle of Man service. It would appear that she was no better suited for the North Wales traffic, so only one of these wonderful old ships remains in the market.

A New White Star Steamer

arrived at Liverpool on the 17th May, having left Queen's Island the previous day. This was the cargo vessel *Delphic*. She is designed for the cargo service of the New Zealand trade where other vessels of the line run in conjunction with those of the Shaw, Savill, and Albion Company. Of these the *Delphic* will be considerably the largest, for she surpasses in size even the *Gothic*. But she is not a vessel of the *Gothic's* class. She will carry no saloon passengers, though, if occasion demands it, she will accommodate large numbers of emigrants or troops. The best description of her may be summed up in the remark that she is a *Cevic* with larger refrigerating chambers. That is to say, she resembles the larger class of cargo vessels with which the White Star Company has done so well on the Atlantic. Her gross tonnage is 8,273 tons, and she is fitted, of course, with twin screws, and triple-expansion engines. Messrs. Haslam's, of Derby, are responsible for her refrigerating installation, and the magnitude of the task they undertook can be gathered from the fact that she has accommodation for no less than 90,000 carcases of New Zealand mutton. The vessel is commanded by Captain Sanders. She is not yet announced as sailing for the New Zealand Line; for the New York trade is at present so brisk that not only are the large twin-screw boats of the line sailing regularly every Friday, but the *Delphic* and the old *Cufic* are to be employed in affording extra sailings on Tuesdays.

The West India and Pacific Steamship Company

are keeping their two big steamers well employed. I mentioned last month that the *European* was under charter to the Union Company. She sailed from Cardiff with a cargo of no less than 11,000 tons. This consisted of railway iron for Delagoa Bay. Now it is announced that her sister, the *American*, is also bound to South Africa. But she started from New York. She has a general cargo of a very miscellaneous character and of about 1,000 tons more weight than that which the *European* loaded. The value is said to amount to £400,000, and to be consigned by no less than three thousand shippers.

The Prince of Monaco

is well known for the interest he has taken, and for the time and money he has spent for the exploration of great sea depths. He is now giving his attention to a matter which will more directly appeal to those who go down to the sea in ships and are subject to the risks of a seafaring life. It will be remembered that after the foundering of the Compagnie Générale's ill-fated steamer, the *Ville de S. Nazaire*, her surviving boats were drifting about off the American coast for some days, what time those whom they contained sustained most cruel sufferings. One of the boats' crews reported, that whilst they were so drifting, they were passed by a cargo steamer, which ignored their signals. This matter has been vigorously taken up by the Prince, who has offered a substantial reward to anyone who can give information which will lead to the identification of the vessel.

There can be no two opinions as to the importance of this matter. Nor can there be any sympathy with the crew of a vessel which passes by on the other side when fellow seamen are seen in distress. There are certain classes of people who are only kept right by the fear of being seen to do wrong. If such as these find that they can be identified and exposed when they evade the calls of humanity on the high seas, they will not only reap the exposure they deserve, but a very salutary lesson will be taught to others, namely: that in case they offend in a like fashion, they will run a great chance of having their inhumanity published to the world.

Repairs at Sea.

Some few months ago I discussed the skill and perseverance of the engineers of a big steamer who managed, in the course of a trip across the Pacific, to fit a new propeller. A similar feat has now been performed in the more stormy waters of the Atlantic by the engineers of the S.S. *Victoria*, of Sunderland. This vessel is a steel screw steamer, built some four years ago at her port of registry by Messrs. Short Bros. She is 351 ft. long and has a gross registry of 3,284 tons, and has engines of very considerable size and power. She left St. Vincent for a Texan port on the 11th April, 1897, and, being overdue, caused considerable anxiety to those interested. The fact, however, was that in mid Atlantic she lost the tail of her shaft and with it the propeller. Her engines were thus, of course, rendered useless. But those on board were equal to the emergency. They depressed the bow and elevated the stern by shifting weights so as to enable a spare shaft and screw to be fitted at sea, and after the delay necessary for so heavy a job to be accomplished under such difficult conditions, she resumed her voyage and made her port in safety. It is much to be hoped that the owners and underwriters concerned, will take measures to recognise the labours and ingenuity of those who served them so faithfully.

Tenders for Transports

were, as usual, requested by the Admiralty in May for the conveyance of the Indian reliefs during the coming season. The conditions which have prevailed in these contracts since the withdrawal of the old Indian troopers were again repeated, and it was stated that four vessels, similar in size and character to those recently employed, would be required for this season. One may well suppose that the vessels which have so success-

fully carried on the service will have the first claim on the Government, and that the contract will be again allotted to the vessels of the P. & O. and British Indian Companies.

Strandings in the Red Sea.

The question of the efficient lighting of the Red Sea is a matter of very great moment, when we regard the enormous amount of the best British steam tonnage which is constantly traversing its waters. Attention may therefore very usefully be called to a Parliamentary paper just published with reference to the question. A return is made of the British ships stranded in these waters since 1884, and full particulars of the circumstances and of the damage sustained in each casualty is given as well as some remarks to show the statistical value of each case. Then in an appendix are given reprints of the inquiries which were held into some of the more important casualties. Altogether 68 cases are included in the return, but only two of these involved total loss of the vessel, though, in some cases, very serious damage was sustained before the vessel came off. Perim Island seems to have had the lion's share of disasters. This, is perhaps not to be wondered at considering its position at the mouth of the Straits. In two of the early inquiries fault was found with the lights over Obstruction Point, Perim Island, and in consequence of this the Indian Government took measures to have the light improved. Several of the strandings were alleged to have occurred through the fact that some of the buoys were out of their proper positions. On the whole it would appear that there is no great need for any further lights on these waters. But while it is incumbent on those who are responsible for the surveying and buoying of this dangerous neighbourhood to be ceaseless in their vigilance, it is equally important for masters and deck officers to navigate with extreme care and not to neglect the use of the lead. From neglect of this precaution and over-confidence have arisen more of the casualties under discussion than from any other source.

Plymouth.

Plymouth seems to suit the North German Lloyd people very well, in spite of the fact that the port cannot yet offer the boat to train facilities which are to be found for ocean passengers both at Southampton and Liverpool. Southampton, by the way, has now, owing to a recent judicial decision, the hope of seeing at its port the umber-coloured coaches of the Great Western Railway. This matter may be a subject of great rejoicing for Southampton itself, but it will not be an equally pleasant prospect for the South Western Railway, which is indeed the maker of the port.

There seems little doubt that the port of Plymouth will now be improved for the benefit of Atlantic travellers, and the rumour that Cunard's are going thither is again revived and repeated with some persistency. I do not think there is much likelihood that Cunard's will ever desert their native port altogether, nor do I think that they will detach any of their fleet just at present. But I should not be surprised if a little later on we were to see the red and black funnels in the Sound occasionally.

The North German Lloyd Company

has certainly done well in its move of developing the Genoa and New York trade. The year 1896 was not a good year for the outward passenger trade. The total of passengers carried by the Bremen boats to the westward showed a diminution of nearly 6,000 persons over the total of the previous year. But the Genoa Line showed an increase of some 5,000 for the same period in the same direction. Thus not only was the grand total of the two lines almost maintained, but the strength of the new offshoot was abundantly proved. Of 55,000 passengers carried by the Bremen Line in 1895, the decrease was not more than 11 per cent. But on the 13,426 carried from Genoa in 1895 the increase was not less than 40 per cent.

The Compagnie Generale Transatlantique

point out that it is incorrectly stated that they have removed the forced draught arrangements from their finest and fastest ship, *La Touraine*. They admit that in their early experience with her there were difficulties and some trouble, but that has all been overcome, and at present she is in regular work with her forced draught and no trouble is experienced with it. There can be no doubt that, when the idea of forced draught was first tried and found effective, it was pressed too far, and caused too great wear and tear of boilers, and that many failures occurred in consequence. But this is the common experience. It takes time to show the true value of any invention and to discover the limits of its usefulness. Now it is recognised that the excessive use of the high air pressure ought not to be maintained. But with moderate use no one can deny that for merchant ships it is very beneficial.

Holyhead Harbour.

It is announced that the Government is about to spend a considerable sum of money on Holyhead Harbour. Part of this will be expended on improvements necessitated by the employment of new mail boats. These seem on the whole satisfactory. Details as to their performances do not come forward, but I notice that the despatch of mails from Queenstown by the White Star and Cunard steamers is generally about an hour earlier than it was when the old boats were running. Some of this shortening of the time of transit must, of course, be credited to the improved land service of the London and North-Western Railway, who have now admitted third-class passengers to these accelerated trains, and, whilst abolishing express fares, offered special inducements to passengers to use the recently neglected second class. Besides the expenditure on the mail accommodation at Holyhead there is, at last, to be a move towards the abolition of the Platters Rock, which for so many years has detracted from the advantages won by former improvements of this port.

An International Courtesy.

The Hamburg-American liner *Arcadia* stranded at Cape Ray on her eastward voyage on the 16th May and for a time was in a very serious position, pounding heavily and making water. But on the 23rd she was towed off by Her Britannic Majesty's warships *Cordelia*, *Buzzard* and *Pelican*, and placed in a position of comparative safety.

The Nippon Yusen Kaisha,

as I have already stated in this column, is building a fleet of a dozen first-class twin-screw steamers in this country. Some of them are already at work and others are in various stages of construction. But the company is not satisfied. It has ordered three more vessels of the same high class from Messrs. Robert Napier & Sons, of Glasgow, who have been one of the first to bring out the vessels ordered under the last set of contracts. It is obvious that the Japanese Mail Line will be a very formidable competitor in the trade between Europe and the Far East.

The Canadian Atlantic Service.

It is now officially announced that the Colonial Office has approved the provisional contract for the fast Atlantic service between Canadian ports and the mother country entered into with Messrs. Petersen Tate & Co., of Newcastle. It would appear that the contractors are to receive not only the half-million dollars per annum from the Colonial Government, but also another quarter of a million dollars from the home Government. They will thus have a subsidy of £150,000 sterling per annum. The hope is expressed that within two years there will be a weekly fast service running. It remains to be seen what the existing lines will do in the meanwhile. They have the connection and existing fleets, and those who have been the pioneers in the trade will hardly sit down to see the business they have got together swept away by a new-comer.

The North German Lloyd Flyer.

From the agents of this company I have received some illustrations and plans of their new steamer the, *Kaiser Wilhelm der Grosse*, which was launched on the 3rd of May at the works of the Vulcan Company, at Stettin, in the presence of the German Emperor. The vessel's dimensions are—694 ft. over all, with a beam of 66 ft., and a depth from her upper deck of 43 ft. The *Times* was good enough to give her depth as her draught. If the "Thunderer's" correspondent had been correct it would have been difficult for her to find a port or a dock in the world. She is fitting with triple-expansion engines, driving twin screws, and designed to develop 28,000 H.P. This is expected to give her a speed of 22 knots at sea. Such speed, if realised, will make her a faster vessel than either the *Lucania* or *Campania*, which vessels, though they have been within a very small decimal fraction of that speed, have never yet maintained it through the whole of any passage. The *Kaiser Wilhelm der Grosse* is of about fourteen thousand tons gross register, or something like a thousand tons greater than the Cunarders. She is to be brig-rigged and fitted with four funnels. These are not placed at equal distances, but are arranged in two groups of two. This is

perhaps not quite the most sightly arrangement. But it is one which is easily defensible to passengers, for it allows the main saloon to be placed between the second and third funnels, or as nearly as possible amidships. This is the position it has had in the *Teutonic* and her sister first, and, more recently, in the *Campania* and *Lucania*, and it is that which is certainly the most comfortable.

In the new vessel there are four passenger decks. On the lower deck there are a number of state-rooms aft. On the deck above there are more state-rooms aft and a nursery. Forward of this comes the second-class saloon extending the whole breadth of the ship. Then a number of ship's offices, the machinery space and the accommodation for the engineering staff, and so to the pantry, which adjoins the main saloon. This is an apartment of upwards of 100 ft. in length. It is approached by a companion, which extends into the saloon itself in the fashion we have seen in the former vessels of the line. There are three main fore and aft dining tables, and a large number of smaller tables placed athwart-ship in alcoves. Forward again are bath-rooms for both sexes, and then another nursery, with state-rooms surrounding it. None of the passenger accommodation on this or any other deck extends forward of the position of the bridge. The upper deck has a very large number of first-class state-rooms amidships, and second-class rooms again aft with the second-class ladies room. On the promenade deck is the second-class smoke-room nearly aft. Some distance forward of this is a deck-house with some of the best deck cabins, and forward again the large smoke-room of the saloon passengers. Under the bridge is a reading-room, and abaft this the finest suites of apartments in the ship. Above the promenade deck is a boat deck, and above all towers the bridge. The vessel has a very long turtle back forward, extending its protection to the foot of the bridge. This is of course advisable in view of the speed for which she is designed. The details I have given are few and imperfect, as I have not, of course, had the advantage of seeing the vessel, but I hope in a future issue to add to them and to correct any inaccuracies they may contain.

BROOKE'S PATENT STEAM DRYER AND PURIFIER.

MUCH attention has been paid of late years to the question of the dryness of steam very materially affecting its efficiency as a motive fluid in the ordinary expansion engine of to-day. Not only from an economical standpoint is it necessary to have dry steam, but also from the point of view of safety; there can be few engineers who have not had some actual experience of the mischief which is wrought by water mixed with steam. This fact has become more pronounced of late years on account of the much higher piston speed that has been adopted in engines, by which the water has not time to get away in time to prevent damage occurring. It is an equally recognised fact that the reason that wet steam will lower the economy and generally destroy the efficiency of an otherwise high-class plant is that the conductivity in pipes and cylinders is greatly increased by the presence of moisture in them, due to the fact that wet steam is a good conductor of heat, while dry steam is an equally good non-conductor.

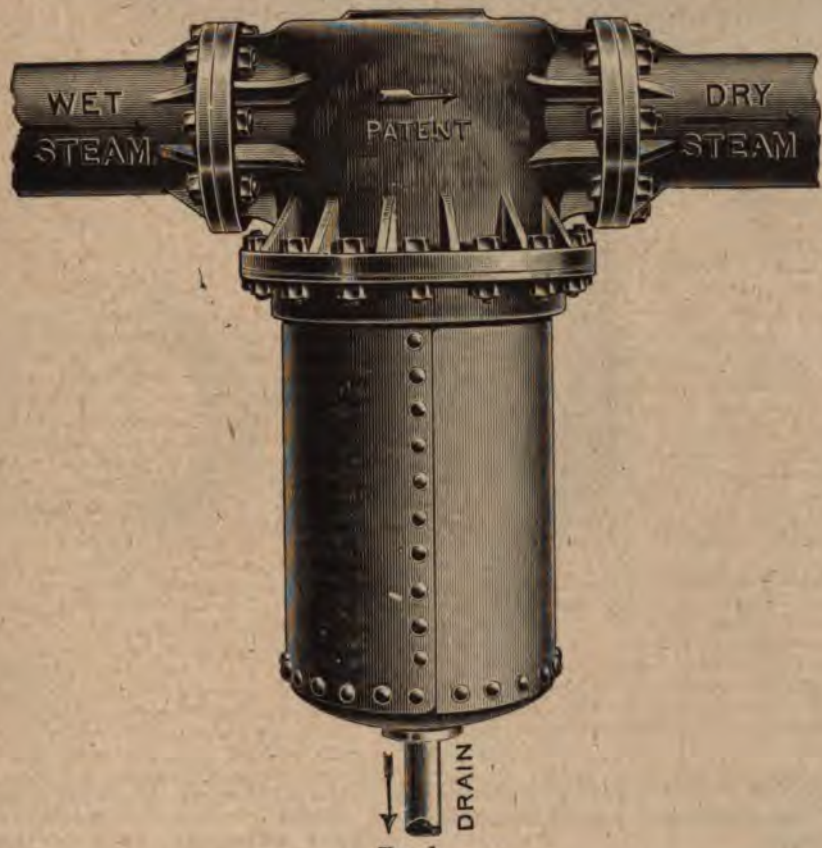


FIG. 1.

We have pleasure in describing and illustrating in the adjoining diagrams, Brooke's patent steam dryer and purifier, manufactured by Messrs. Holden & Brooke, of Sirius Works, West Gorton, Manchester. Fig. 1 represents an outside view of the device. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a sectional plan of the lower part of the body, and

Fig. 4 is a view of various parts of the device detached from one another.

The essential features of a perfect separator are that the steam should pass through the device quite unobstructed, that its velocity during such passage should be reduced, and that the direction of the steam should be changed without the intervention of any mechanical obstruction. It is claimed that in Brooke's system all these factors are combined, the area throughout the apparatus being greatly in excess of that of the steam pipe.

It will be seen from the illustrations that the device consists of a casting inserted into the line of the steam pipe, and having a downwardly extending chamber or body, within which two sets of cylindrical walls are arranged one within the other, concentrically to each other and to the body of the device. Each of these walls has a vertical slot or passage, the slot of one being arranged on the opposite side to the slot of the other. The upper part of the casting carries internally, a seating dividing the inlet orifice from the outlet orifice. Upon this seating the cylindrical walls are supported by a bolt passing centrally downward, clamping them between an end plate and the seating; the ends merely abutting against their supports, an absolutely tight joint being unnecessary.

The steam enters at A and passes round the outer annular space, then through the slot round the inner annular space B, and thence through the other slot into the central passage C to the steam pipe.

In doing this it will be noticed that the steam is made to greatly lessen its velocity, to continually travel in a circular course, and to change its direction of movement twice. The invariable tendency of all moving particles being to travel in a straight line only, it follows that even should any particle of water, grease, grit, &c., on entering the dryer retain velocity enough to "hustle" round the first curve, it would be a practical impossibility for it to "double" on itself and get round the second. Therefore, whatever particles enter the dryer they are unable to follow the circular course traversed by the steam, they lose their momentum, especially as the velocity of the steam which

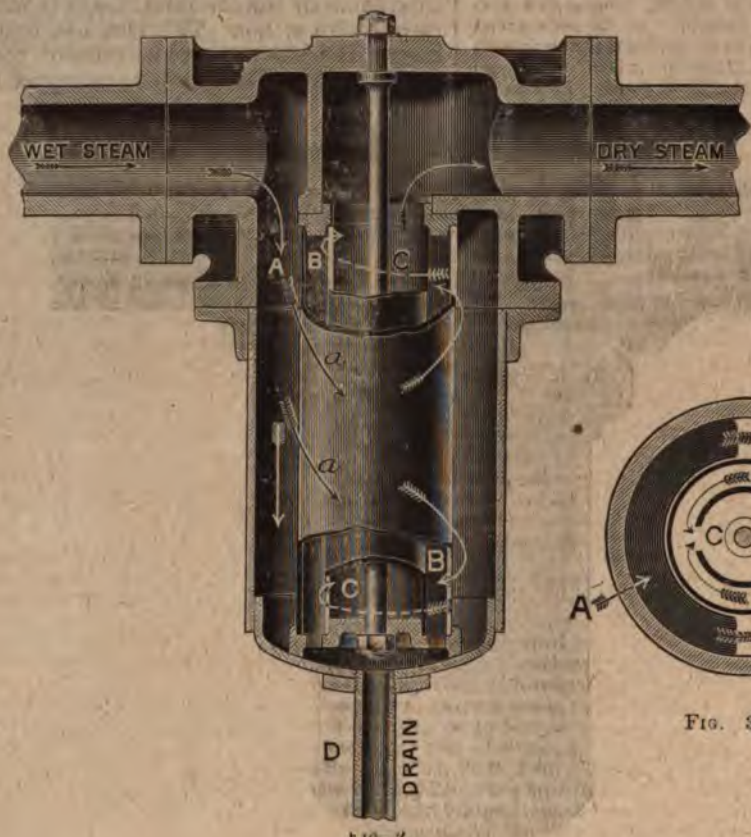


Fig. 2.

Fig. 3.

Fig. 4.

gives them their motion is reduced, and they are consequently compelled to drop out of the current and fall to the bottom of the device. The deposited water, &c., passes away by the pipe D, which may lead to any suitable cock or trap, or under suitable circumstances to the boiler itself.

The simplicity of construction of the device is well exemplified in Fig. 4, in which the various parts of the device are shown disassociated from one another ready to be assembled into their complete form.

Messrs. Holden & Brooke manufacture an anti-primer on a similar principle, which is fitted direct on the boiler, and which separates any priming water carried up by the steam, and returns it to the boiler.

By the use of these devices fitted to the boiler or to the steam pipe close to the engine, the supply of dry steam to the latter can be absolutely assured, and the accompanying advantages giving high efficiency of the motive fluid be obtained.

THE ROYAL VISIT TO SHEFFIELD.

MESSRS. CAMMELL & CO., LIMITED, have been honoured by a visit of Her Majesty to their Cyclops Works at Sheffield, as she had expressed a wish to see her sturdy toiling subjects at work on the production and rolling of an armour plate.

The Queen's route to the Cyclops Works must have given Her Majesty a very graphic and novel view of the industrial quarter of a manufacturing town, and the artizans' labourers with their families who toil and live there, though, of course, the route had been exceptionally beautified for her passage by extensive decorations. Needless to say, the reception of the Queen by the masses of the working classes was marked by an energy of enthusiasm rendered all the more stentorian by the hardy and laborious character of the crowd.

In Messrs. Cammell & Co.'s works also decorative art had been called in to render it more beautiful. The entrance to the department containing the armour plate furnace had been transformed into a garden most picturesque with its flowers, vines, and firs.

The stand nearest the dais was occupied by the following.—Major and Mrs. Acton, the Duchess of Buccleuch, Captain and Mrs. Boynton, Mrs. Herbert Bramley, Colonel and Mrs. Brooke, the Mistress Cutler, Mr. and Mrs. Charles Cammell, Mr. and Mrs. G. H. Cammell, Mrs. W. E. Clegg, Sir Herbert Croft, Bart., Colonel the Viscount Downe, C.I.E., Mr. and Mrs. Duffield, Lieut.-Colonel the Hon. C. Dutton, the Ven. Archdeacon Eyre, M.A., the Earl Fitzwilliam and family, and Lady Alice Fitzwilliam, Mrs. G. Franklin, Viscount and Viscountess Galway, Mr. S. W. Johnson, Derby; Mr. and Mrs. T. W. Jeffcock, Mr. A. G. Longden, Major the Hon. O. V. and Mrs. Lumley, the Hon. Mrs. and Misses Maclagan, Mr. and Mrs. P. Hodges, Mr. W. L. Mugliston, Derby; Mr. and Miss Mundella, General and Mrs. Thynne, Mr. Samuel Oates, the Duke and Duchess of Portland, Lieut.-Colonel W. Pollitt, Manchester; Captain Harry Pollitt, Manchester; Major-General and Mrs. T. Phillips, Mr. and Mrs. Samuel Roberts, Captain and Mrs. Russell, Mrs. Anson Farrar and sister, Mrs. C. T. Skelton, Colonel and the Misses Sidebottom, Lady Vincent, Sir William and Lady White, Mr. F. C. Wild, Sir Henry and Miss Watson, and a friend, Mrs. and the Misses C. B. Stuart Wortley, Mr. and Mrs. C. Macro Wilson, Captain and Mrs. Stuart Wortley, the Earl and Countess Wharncliffe.

The Queen was conducted to a dais surrounded by a crowd of invited guests, the Mayor and Mayoress, the Duke of Norfolk and Lady Mary Howard, Sir Henry Watson, chairman of the company, Mr. Alexander Wilson, managing director, and Mrs. A. Wilson. The operations were then at once commenced by a staff of 60 furnace-men, directed by Mr. Stringer, the manager of the furnace-plate mill.

The plate, which had been in the furnace 19 hours, weighed in the rough 35 tons. It had been reduced from the ingot by the enormous 6,000 tons hydraulic forging press, which Messrs. Cammell & Co. were the first to introduce into England, and which is one of the most powerful machines of its kind in existence.

At the proper moment the furnace doors were lifted, and the intense heat and vivid glare were cast upon an assembly such as may never be seen again in such circumstances. The Queen and Princess Christian narrowly watched the operations through coloured glasses, whilst the gigantic mass of incandescent metal was seized by the gigantic pincers and placed on the trolley, and from thence to the rolls, where it was rolled down to the finished size of plate, 13 ft. 6 in. by 7 ft. 6 in. width and 12 in. in thickness.

This completed the process as watched by Her Majesty, as her time was limited, and she shortly departed with gracious adieux to her hosts, by the island platform.

Messrs. Cammell & Co. are recognized as being the leading firm in the production of all kinds of Siemen's-Martin, or Bessemer ingots, plates, or forgings, and the largest manufacturers of armour plates, either in steel, Harveyed steel, or any desired form of material.

They employ now in their various works and in their collieries about 10,000 men, and the organization and control of such a vast productive community must be a great tax upon the able managers and directors.

In the Cyclops Works, besides the heavy plate production, there are manufactured also other articles pertaining to the Sheffield trade, such as axles and forgings for locomotives, cast steel for all engineering purposes, files, fish-plates, and other descriptions of tools. At the Grimesthorpe Works forgings for ordnance, shells, tyres, springs, and buffers are produced, whilst at the Derwent works, in Cumberland, the company have probably the finest plant for producing steel rails extant.

The firm have received orders from the Lords of the Admiralty for armour for 122 ships of Her Majesty's Navy, those now being manufactured being for the *Ocean*, *Glory*, *Albion*, *Goliath*, and *Canopus*.

THE MACHINE LABOUR QUESTION IN THE ENGINEERING TRADES.

IN the forty-sixth annual report of the Amalgamated Society of Engineers, just issued to the members—which shows an increase of membership on the year of 8,321, bringing the total membership to 87,455, and an increase in the reserve fund of £99,766, bringing the total assets of the society up to £305,882—the general secretary, Mr. Geo. N. Barnes, deals at length with the important question of the employment of skilled labour on machine tools, which just now threatens to bring about a serious struggle in the marine engineering and other branches of industry. Mr. Barnes introduces his remarks by referring to the strike at Hull last year over the rating of a milling machine, and then proceeds:—"Our members there objected to the placing of a low-paid and unskilled man upon the machine in question, and after a strike extending over four months, and sustained with a splendid determination, the interest of the skilled engineers was established, and the wage paid for operating the machine raised to that current in the trade. The same question will doubtless have to be fought out elsewhere, and it is of the utmost importance that we should be clear-headed in regard to it. It should never be lost sight of that the proportion of machine to hand work is an increasing one, and that to lose control of the machine is to a large extent to lose control of the trade. Machines are being adapted to a wider range of work, and if skilled engineers are to retain a position in the trade they must follow the work to the machine, or otherwise lower wages will be paid, and nobody will benefit except the employer, and perhaps (?) ultimately, the purchaser. Bluntly put, such is the position, not only from the point of view of the engineer, but from that of the community, inasmuch as it is of public importance that a high standard of wages, and therefore a high purchasing power, should be maintained. The employer, on the other hand, claims absolute freedom to exercise authority in the selection and placing and paying of workmen, because, he says, he provides the machinery and plant. But he forgets that this freedom in the conduct generally of business has long since been taken away from him, and that he is now only at liberty to conduct industrial enterprise in accordance with public opinion, as embodied in Parliamentary enactment and the pressure of trades unionism. As a result of these humanizing influences, hours of labour have been reduced, boy labour curtailed, machinery fenced, and workshops cleansed—in short, competition has been forced u

to a higher plane with immense advantage to the commonweal, so that the employer's plea 'to do what he likes with his own' is somewhat out of date, and cannot be sustained. We are willing, however, to admit that in certain directions both employer and employed should have freedom of action. Our society, for instance, has never questioned the rights of the employer to terminate contracts, to select and discriminate between workmen, and to pay according to merit or skill. But it has stipulated, and has a right to stipulate, for the observance of a standard or minimum wage as a basis. And if, as has been stated by the employers' council, the introduction of machinery has simplified production and widened the difference as between the skill of the machine and the hand operators, then the wage of the handicraftsman should be proportionately increased. The introduction of machinery increases as well as simplifies production, and here surely is sufficient gain for the employer and the purchaser without trenching upon the wage of the worker, whose needs remain the same, whether tending a machine or using his tool by hand. Upon this ground we base our claim, but convinced as we are that this, like most other questions, must ultimately be settled in accord with the common interest, and believing as we do in the utterance of the late Lord Derby, that 'the greatest of all interests is peace,' we are willing to leave the matter to the arbitrament of a public and impartial authority, aided by technical knowledge on each side. So far we will concede rather than risk the dislocation of industry, which would accompany the clashing of contending forces, but beyond this we cannot and will not go."

Since the above report was issued there has been a further correspondence between the Secretary General of the Amalgamated Society of Engineers, and the Federation of Engineering Trades Employers' Associations, which would seem to indicate that the Trade Union Organisation does not intend to persist in the special conditions they have been attempting to enforce with regard to the employment of skilled labour on machine tools, and the general impression is, that the threatened dispute on the above question may now be regarded as practically at an end.

THE LAIDLAW, DUNN, GORDON COMPANY'S PUMPING MACHINERY.

FOR some years past the Americans have been much to the fore with pumping machinery, and have pushed their trade in this country to a considerable extent.

The business in this particular commodity here must be such as to encourage our cousins over the water to seek for further extension of trade, seeing that another American firm, the Laidlaw, Dunn, Gordon Company, of Cincinnati, Ohio, U.S.A., are introducing to this country their duplex steam pumping machinery.

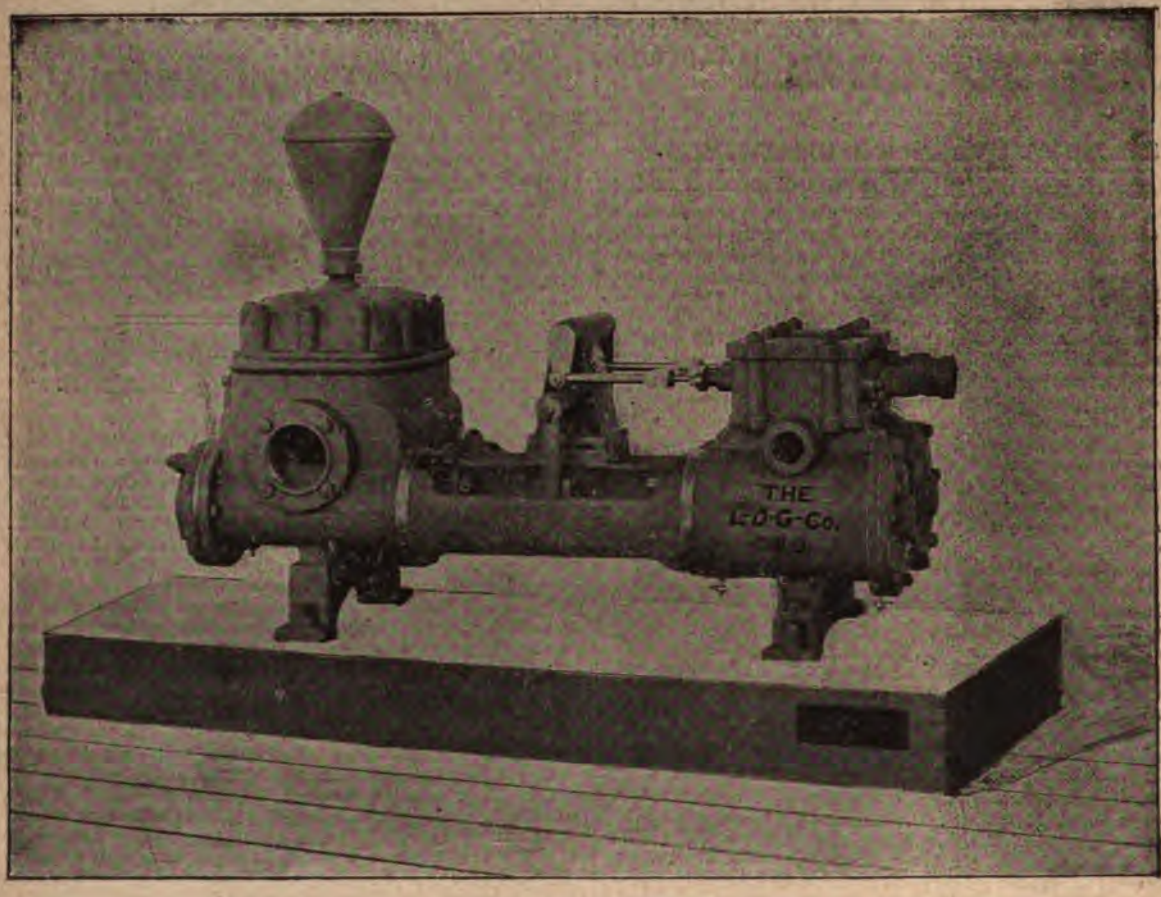


FIG. 1.

We illustrate in the adjoining diagrams two of their special designs of duplex pumps,—Fig. 1 representing a perspective view of their standard duplex piston pump for boiler feeding and general pumping purposes; Fig. 2 representing a longitudinal vertical section of the same through one engine, and Fig. 3 representing a perspective view of a special high-pressure water-works pump.

It is claimed by this American company, that as the result of a very wide experience in this class of machinery they have been enabled to produce designs of pumps which have several noteworthy features. The valve gear is of the simpliest description, and the valve rods and levers are made of equal lengths respectively, and are consequently interchangeable. The valve motion is probably the part which is subject to the greatest wear and tear in this class of machinery, and upon its efficiency depends the proper working of the pumps. For this reason these pumps are fitted with a new type of valve motion consisting of a sliding block in combination with a roller on the valve lever, which has been designed with a view of getting the least friction and consequently the longest wear possible. As a matter of experience, it is found to be the rule that this motion now wears as long with proper care as any other moving part of the machine. It is much less liable to get out of repair compared with ordinary movements, because of its few parts.

Another special feature of these pumps is in the construction of the water end, which is fitted with interchangeable and removable linings.

These linings are easily taken out and changed, thus making the life of the water end double what it would be if solid bored, or brass, or copper lined.

The linings are so arranged that they are always held firmly in place, and cannot tilt or move in such a way as to pass water from one end to the other.

The steam and water cylinders are both bored out atthe same time on special machinery, in order to prevent the chance of imperfect alignment, and consequent heavy friction and wear.

Messrs. Bagshawe Brothers, of 159, Queen Victora Street, E.C., have been appointed sole European agents for the Laidlaw, Dunn, Gordon Company, and they are in a position to state that as the pumps are very carefully manufactured and tested before leaving the works, they are enabled to guarantee the satisfactory working of each pump they supply.

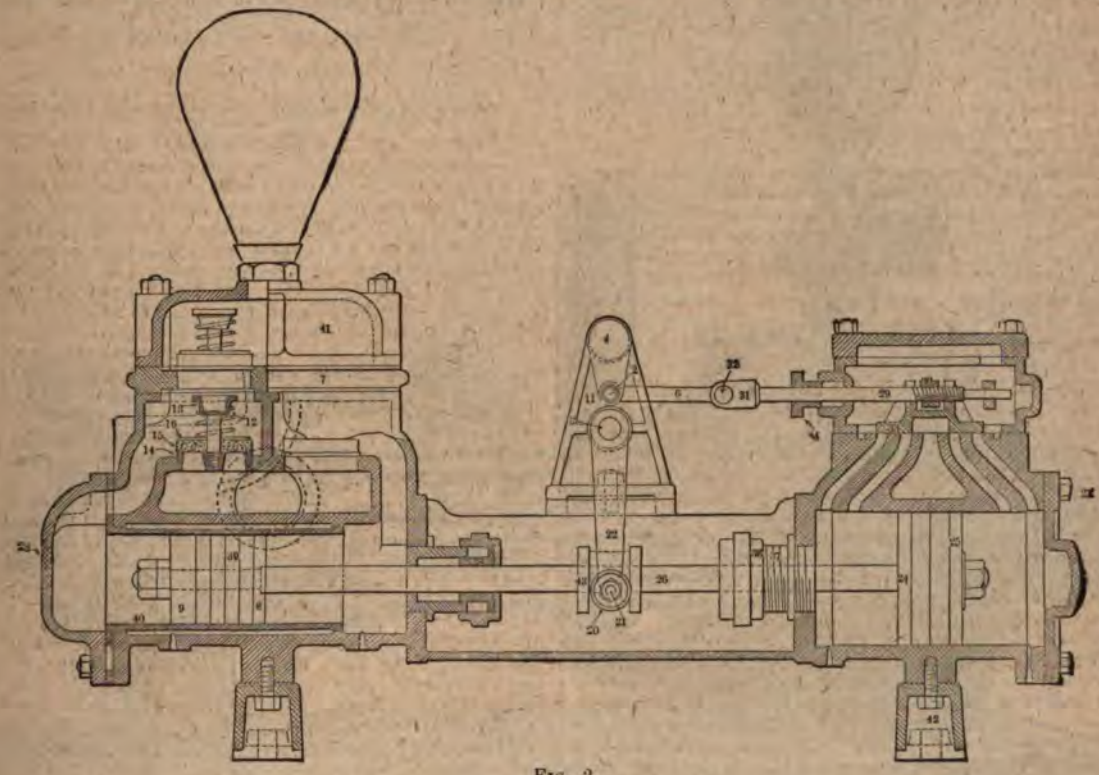


FIG. 2.

THE INSTITUTION OF NAVAL ARCHITECTS.

INTERNATIONAL CONGRESS OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

IT is our very pleasant duty to call the attention of our readers to the fact that the Institution of Naval Architects intend to celebrate the 60th year of the reign of Her Majesty the Queen, by holding an International Congress of Nava Architects and Marine Engineers in London in the month of July.

H.H.R. the Prince of Wales has graciously consented to act as Hon-President of the Congress, and will, in person, open the proceedings at the Imperial Institute, South Kensington, on Tuesday, July 6th, at 11.30 a.m. The Council of the Institution are, we understand, also receiving the most valuable co-operation from H.M. Government and from the Right Hon. the Lord Mayor of London.

The meetings for the reading and discussion of papers will be held at the Imperial Institute in two rooms simultaneously.

We understand that the Council of the Institution have considered this to be a favourable opportunity on which to invite to this country the numerous friends of the Institution in France and Germany who have, during the last two years, received the members with so much hospitality in Paris, Berlin, Hamburg and Stettin. The Council have also invited the Ministries of Marine of all the principal Naval Powers of Europe, America and the Far East, to be represented at the Congress, as

well as the Association Technique Maritime, and the American Society of Naval Architects and Marine Engineers, these being bodies having similar objects to the Institution of Naval Architects.

We have been informed that the invitations have met with wide acceptance, and the members no doubt look forward to welcoming to this country a large number of foreign guests. In order to provide the latter with a fitting welcome, a numerous and representative Reception Committee has been formed, and a fund has been raised, exclusively amongst the members of the Institution, for the entertainment of the guests.

A programme has been drawn up by the Reception Committee, and has been approved by H.R.H. the Hon. President, a sketch of which is given hereunder.

MONDAY, JULY 5th.—Conversazione in evening at Hotel Cecil.

TUESDAY, JULY 6th.—11 a.m. Reception of Foreign Delegates by the President and Reception Committee of the Congress at the Imperial Institute. 11.30 a.m. Reception of H.R.H. the Prince of Wales, K.G., Hon. President of the Congress. Speech of welcome by H.R.H. the Hon. President. Inaugural Address by the President, the Right Hon. Earl of Hopetoun, G.C.M.G. Reading and discussion of papers in two halls at the Imperial Institute. 2 p.m. Luncheon in Pavilion at Imperial Institute. After luncheon a visit will be paid to the Yachting and Fisheries Exhibition at the Imperial Institute. 9 p.m. Reception at the Mansion House by the Right Hon. the Lord Mayor.

WEDNESDAY, JULY 7th.—10.30 a.m. Reading and discussion of papers at the Imperial Institute. 1.30 p.m. Luncheon in Pavilion at Imperial Institute. If necessary continue papers after luncheon. 7 p.m. Institute dinner at the King's Hall, Holborn Restaurant. 10 p.m. Reception by a member of the Government.

THURSDAY, JULY 8th.—10.15 a.m. Excursion by steamer from Westminster Stairs to the Tower Bridge and London Docks. Luncheon at the Royal Albert Dock, followed by a visit to the Thames Ironworks. 8.30 p.m. Festival concert at the Queen's Hall, Langham Place, followed by a supper.

The intention is to show at this concert what can be done by exclusively British performers. The orchestra will be composed of 110 past and present members of the Royal College of Music. The chorus will be selected from the very finest choirs in the West Riding of Yorkshire, constituting the famous Leeds Festival Choir, to the number of about 220. Madame Albani will be principal singer. Dr. C. Villiers Stanford will conduct. The programme will be of an International character, pieces being selected from the leading composers of France, Germany, Italy, Russia and Great Britain. The details of the programme will be settled by Dr. Hubert Parry, principal of the Royal College of Music, and Dr. C. Villiers Stanford, Professor of Music at Cambidge University and conductor of the Royal College of Music.

FRIDAY, JULY 9th.—A special train will convey the guests and members of the Institution to Southampton Docks, where they will embark on steamers and proceed to Portsmouth Dockyard, which will be visited by permission of the Lords of the Admiralty. Luncheon on board the steamers. There will be a display of the evolutions of torpedo boats, followed by a cruise in the Solent. Return to London by special train. 9.30 p.m. Reception by the Hon. T. A. Brassey and Lady Idina Brassey, at 24, Park Lane. This reception will be by invitation only, as the number which can be accommodated are limited,

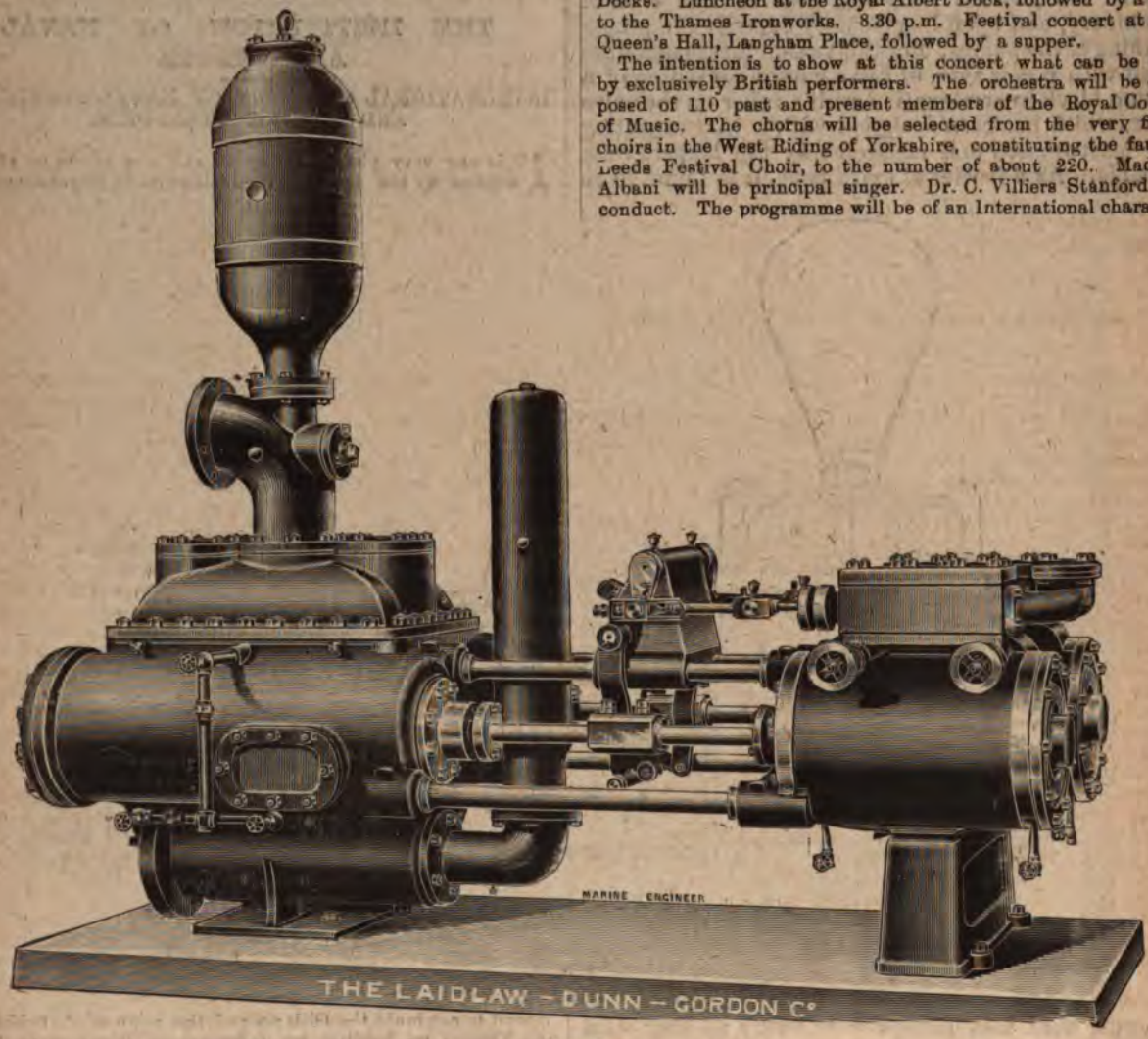


FIG. 3.

SATURDAY, JULY 10th.—This day is reserved for pleasure excursions, if possible on the River Thames, further particulars of which will be duly announced. It is proposed to conclude the week's proceedings by bringing the guests and members to Richmond in the evening to dine, and after dinner a river fête and a display of fireworks and illuminations will be arranged.

In the following week the foreign guests, accompanied by the members of the Reception Committee, are invited to visit the works of the Fairfield Co. at Glasgow, of Messrs. William Denny Brothers at Dumbarton, of Sir W. G. Armstrong & Co., at Elswick, and of Messrs. Palmer at Jarrow-on-Tyne.

We cannot close this notice without congratulating the Council and Mr. George Holmes, the courteous and energetic secretary of the Institution, upon this excellent and comprehensive programme, and we hope that the care and thought that has evidently been bestowed upon the details of it will ensure the members and their guests enjoying a season of interesting intercourse and recreation, so that the members of the Institution may mark by these proceedings to some small extent, their appreciation of the hospitality and kindness they received at the hands of their foreign guests when they visited France and Germany a short time ago, and extend to them the right hand of good-fellowship during their visit to our shores.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

IT has been estimated that no less than a quarter of a million spectators will witness the great Jubilee Review at Spithead. Owners of passenger boats of all descriptions continue to bombard Staff-Commander Hawkins Smith, the Master of the Fleet, for anchorage room for their vessels, and where they are all to be put is a somewhat difficult problem for the naval authorities to solve. Every facility will be afforded the excursion steamers for steaming round the warships before the Review, but just before this commences all boats not officially taking part in it will have to take up the anchorage assigned to them. It is announced that 21 battleships, 11 first-class, 27 second-class, and 6 third-class cruisers, 2 gun vessels, 20 torpedo gunboats, 3 gunboats, 30 torpedo-boat destroyers, 20 torpedo-boats, 18 training squadron ships and 8 special service vessels will take part in the naval spectacle at Spithead. The twenty foreign war vessels will include seventeen flagships. Italy is to be represented by the Prince and Princess of Naples, who will come over in the Italian Royal yacht, convoyed by two warships, which will remain for the Review. The Prince and Princess of Wales, the Duke of Saxe-Coburg and the Duke of York will lead the Royal flotilla in the *Osborne*, members of the Royal Household will witness the show from the *Alberta* and *Elfin*, Mr. Goschen and the other members of the Admiralty will be in the *Wildfire* and *Enchantress*, and the diplomatic body will have the *Vivid* placed at their disposal. Accommodation for the gentlemen of the Houses of Lords and Commons will be afforded by the steamship *Campania*. The whole of the British warships will be illuminated upon a magnificent scale, and it has been arranged that the week following the Review will be devoted to a round of festivities in honour of the visitors who will take part therein.

The Ships which will take part in the Review.

Attention is now naturally concentrated upon the various fetes in commemoration of the record reign, but of all these functions, the most interesting to many will be the Review. About 18 miles of ships are said to have been found in the Jubilee Review of 1887, but the coming Review will see nearer twice that length of ships. The vessels will most likely be moored in three lines, a scheme of arrangement which would give a much more imposing appearance than if the lines were any deeper. Many vessels home from foreign stations will take part, the *Endymion* and *Minerva*, recently home from China; the *Bonaventure*, from the East Indies, and the *Edgar*, home with the relief crews of the *Undaunted* at Colombo. The *Royal Arthur* from the Australian station will take part, as will the *Satellite* from the Pacific. The other vessels which will be seen at the Review are the battleships *Majestic*, *Magnificent*, *Prince George*, *Mars*, *Jupiter*, *Victorious*, *Repulse*, *Resolution*, *Royal Sovereign*, *Empress of India*, *Renown*, *Collingwood*, *Benbow*, *Alexandra*, *Colossus*, *Edinburgh*, *Howe*, *Inflexible*, *Devastation*, *Thunderer*, *Sans Pareil*. Of first-class cruisers there will be the *Powerful*, *Terrible*, *Blake*, *Blenheim*, *Australia*, *Galatea*, *Warspite* and *Aurora*; second class, *Hermione*, *Charybdis*, *Mersey*, *Melampus*, *Æolus*, *Spartan*, *Flora*, *Naiad*, *Latona*, *Venus*, *Diana*, *Dido*, *Isis*, *Phœton*, *Leander*, *Apollo*, *Andromache*, *Thetis*, *Tribune*, *Terpischore*, *Brilliant*, *Sappho*, *Juno*, *Doris* and *Sirius*. Third-class cruisers: *Pelorus*, *Medea*, *Medusa*, *Magicienne* and *Barracouta*. Torpedo gunboats: *Halcyon*, *Speedy*, *Jaseur*, *Spanker*, *Niger*, *Leda*, *Sheldrake*, *Renard*, *Onyx*, *Circe*, *Gossamer*, *Jason*, *Sharpshooter*, *Spider*, *Alarm*, *Antelope*, *Hazard*, *Skipjack*, *Gleaner*, and *Rattlesnake*. The gun-vessels *Curlew* and *Landrail*; the gunboats *Raven*, *Cockchafer*, and *Starling*; the torpedo-boat destroyers *Hasty*, *Lightning*, *Hunter*, *Ranger*, *Hardy*, *Contest*, *Janus*, *Sturgeon*, *Salmon*, *Snapper*, *Haughty*, *Decoy*, *Ferret*, *Lynx*, *Daring*, *Skate*, *Sunfish*, *Opossum*, *Quail*, *Virago*, *Thrasher*, *Sparrowhawk*, *Desperate*, *Fame*, *Havock*, *Hornet*, *Spitfire*, *Rocket*, *Foam*, and *Whiting*. Torpedo boats 52, 53, 55, 57, 58, 64, 65, 66, 67, 68, 71, 72, 73, 74, 76, 77, 79, 81, 83, 85. The training ships and brigs including the *Active*, *Volage*, *Calypso*, *Champion*, *Northampton*, *Calliope*, *Curacoa*, *Agincourt*, *Minotaur*, *Black Prince*, *Racer*, *Wanderer*, *Martin*, *Sealark*, *Seaflower*, *Pilot*, *Nautilus*, and *Liberty*, and the special service vessels *Hearty*, *Jackal*, *Albacore*, *Magnet*, *Traveller*, *Seahorse*, *Research*, and *Triton*. The vessels are to assemble on the 22nd of this month: so that the public will have a good opportunity of seeing the fleet before the actual Review takes place.

The Annual Naval Manœuvres.

In the excitement occasioned by the great Review the annual mobilization of the fleets for the manœuvres does not seem to have attracted so much attention as is usually the case. It is probable that the number of ships taking part in the great sham fight this year will be greater than on previous occasions, but a great many of the ships taking part in the spectacle at Spithead will immediately proceed to foreign stations, and all ships which are only temporarily commissioned will return to their respective ports to pay off, while those which were previously acting as tenders will return to their original duties. The detailed programme is not yet finally completed, but we may safely reckon on the following vessels taking sides in the annual simulated hostilities at sea:—The battleships *Majestic*, *Magnificent*, *Prince George*, *Mars*, *Jupiter*, *Victorious*, *Repulse*, *Resolution*, *Royal Sovereign*, *Empress of India*, *Renown*, *Collingwood*, *Benbow*, *Alexandra*, *Colossus*, *Edinburgh*, *Howe*, *Inflexible*, *Devastation*, *Thunderer*, and *Sans Pareil*; the first class cruisers *Blake*, *Blenheim*, *Australia*, *Galatea*, *Powerful*, *Terrible*, *Royal Arthur*, *Endymion*, *Edgar*, *Warspite*, and *Aurora*; the second-class cruisers *Hermione*, *Charybdis*, *Mersey*, *Melampus*, *Æolus*, *Spartan*, *Flora*, *Naiad*, *Latona*, *Venus*, *Diana*, *Dido*, *Isis*, *Phœton*, *Leander*, *Apollo*, *Andromache*, *Thetis*, *Tribune*, *Terpischore*, *Brilliant* *Sappho*, *Juno*, *Doris*, and *Sirius*; the third-class cruisers *Medea*, *Medusa*, *Magicienne*, and *Barracouta*; and the torpedo gunboat *Halcyon* and *Speedy*.

Portsmouth Dockyard.

Work at this yard on the various ships building and under repair has temporarily given way to preparations for the Review. The number of ships which this port will furnish will not be so large as that provided by the other ports, but it is impossible to do more than commission all the available ships, and apart from this altogether the officials here will have enough to do on account of the mobilisation taking place so close at hand. The Admiralty have specially set aside a vessel in which the Corporation can witness the Review and as something in the nature of a return for this kindness the Corporation have given the Admiralty the free use of the Town Hall for a week. Staff-Captain T. H. Rapson has been appointed assistant Staff-Captain here, although it was only a few weeks ago that he was chosen for the post of Staff-Captain in charge of Keyham Dockyard. A great strain was put upon the dockyard staff in connection with getting the *Powerful* ready for the pennant, and swarms of men have been at work upon the *Mars*, getting her ready for gun trials. The Admiralty requirements in respect to the fittings of the *Mars* were not strictly complied with by the contractors, and a great crowd of joiners had to be put on overtime to undo the work already done, a thing which frequently happens in regard to ships delivered from private yards. Anglesea Barracks have at last become the property of the Admiralty. Previous to this there were over three thousand men on the depot ships, but the mobilisation will cause quite another thousand to be added to

these. However, these men can now be accommodated in the Barracks, and it is to be hoped that the overcrowding that has taken place in previous years will be done away with. The idea of allowing the old *Victory* to take part in the review has been mooted here. Undoubtedly her appearance would be hailed with delight by a great number of people, but there is not the slightest likelihood of her being towed to Spithead. As soon as the manœuvres are over the *Powerful* will probably take an ocean trip, probably to Halifax or New York. Her engine-room staff have little doubt that she will come out of such a trial with flying colours, even supposing she did the journey at top speed.

The Training of Naval Cadets.

The clauses in the new regulations for the entry of naval cadets relating to the age and examination of the candidates, have aroused a good deal of discussion as to whether they will make for good or otherwise in the Navy. The regulations are to come into force for the examination to be held in December next, and specify that the maximum age of entry is to be 15½ years, the minimum age being fixed at 14½. Henceforward the examination of the candidates is to be framed as much as possible in order to allow the customary education of our public schools to compete with that afforded by the "crammer." The hope of the First Lord of the Admiralty is, that by these means he will be able to rely more upon the great public schools for a supply of young officers. The opinion is expressed by many, that with the help of these new regulations the secondary schools have now an opportunity which, if they choose, they can take full advantage of, and finally make themselves the chief means of entry to the naval service. The principle of "cramming" is generally admitted to be a most baleful one. In Germany, in order that the cadets should have the full benefit of a public school training, the age of entry to the naval service is from 16 to 18 years of age, but, of course, there are many disadvantages attached to this system. The Admiralty have certainly made an effort to improve the education of our naval officers, and it is to be hoped that the disadvantages which are at present in the way of fulfilment of their desire will speedily disappear. One of the disadvantages of the new regulations will be that the private master will have another year in which to "cram" his pupils, while the unsuccessful candidate at 15½ years of age will be too old to recommence his ordinary education at a public school.

Torpedo Nets for Battleships.

The statement that the officers of the *Vernon*, the torpedo schoolship at Portsmouth, have designed a torpedo-net which will resist any scissors yet invented, has again brought forward the question as to whether nets are of any real value as a protection against torpedoes to battleships. It has been alleged that the torpedo net booms on the *Majestic* type are to a certain extent valueless, and give much more trouble than they are worth. Those who advocate the abolition of the net declare that it not only adds to the weight which the ship has to bear, but that it can only be used to fortify ships at anchor against torpedoes, and that supposing it were possessed of all the advantages claimed for it by its advocates, it is doubtful if a second torpedo would not easily find its way through the gap made by the explosion of its predecessor. It is also alleged that it interferes with the action of the guns and masks the torpedo tubes. Altogether the weight of opinion of English naval officers seems to be against it. The decision arrived at by the French Admiralty to do away with them entirely is regarded as a step in the right direction. It has been decided to dispense with their use both in the vessels already built and in those which are building. The resolve to do away with the net in the French Navy originated as far back as 1892.

Chatham Dockyard.

The building work here is making good progress, especially on the *Illustrious*, which will not be a great while before she is completed. The *Goliath* will not be ready for launching by the time fixed by the Admiralty if any of the men engaged on her are taken away to work on other vessels which will have to hoist the pennant for the Review. It is doubtful if the present staff will be sufficient for the purpose, and most probably the workmen now on the *Vindictive* will have to be turned on to her. The store-ship *Wye* had to be taken in hand for repairs and overhauling, and the torpedo gunboat *Speedy* needed similar treatment. The re-arming of the *Mersey* is still going forward, as is the refitting of both the *Porcupine* and *Snapper*, and the *Warspite*, *Thetis*, and *Isis* will shortly hoist the pennant, and the work on these has been the cause of numbers of workmen engaged on vessels building to be temporarily taken off the latter and put to work on the former. The *Illustrious* should be completed by the 31st of October, but this will probably have to be postponed. One of the barbette mountings has been placed in position, but those for the after barbette have not yet been delivered. The official gun trials of the *Jupiter* passed off successfully, and she is rapidly approaching completion. Some hundreds of men are still at work upon her, most of them on overtime, and it is hoped that she will be ready to be handed over to the Dockyard Reserve very shortly. When commissioned she will take the place of the *Empress of India* in the Channel Squadron. The docks here are every one of them full of ships being prepared for the coming mobilization. It has been reckoned that some six thousand men of various ratings will be required for the mobilization, and in consequence placards have been pasted up at the dockyard gates and "ads." inserted in the local papers asking for young men to join the Navy as stokers, with excellent results.

Torpedo-boat Destroyers' Trials and Launches.

The launch of the torpedo-boat destroyer *Flirt*, from Palmer's shipbuilding yard, completes the eight boats which the Palmer Co. were under contract to build for the Navy. The launch was carried out without a hitch. Her dimensions are:—Length, 215 ft.; breadth, 20 ft. 9 in.; with a displacement of 300 tons. She will be armed with one 6-pounder quick-firing gun forward, two on each side, and one aft, in addition to two revolving torpedo tubes on deck arranged to fire on either side. She is guaranteed to have a speed of 30 knots. The destroyer trials which have taken place include those of the *Whiting*, which took place at Portsmouth, the result being most satisfactory. Throughout the trials she was steaming at the contract speed of 30 knots, and at one period she was running at 32, the absence of vibration being very marked. The coal consumption trials of the *Foam* were successfully carried out at Sheerness, as were her subsequent gun mounting trials in the North Sea. The destroyer *Quail*, built by Messrs. Laird, was sent down from Birkenhead to Plymouth to have her guns and torpedo tubes placed on board, as it is intended she is to take part in the Naval manœuvres. Indeed, all the above-mentioned boats will do so, with the exception, of course, of the *Flirt*. The preliminary trial of the *Chamois* also gave results which must be satisfactory to her builders. She is fitted with Reed's patent water-tube boilers. The results of the twelve hours' coal-consumption, gun-mounting, and anchor trials of the *Fame* were extremely good, the required speed being obtained with a small expenditure of coal.

The Navy as a Profession.

The lecture which Lord Charles Beresford delivered at Newbury on the Navy as a profession, and in the course of which he pointed out the great disadvantages compared with the benefits derived, has not aroused the interest which might have been expected. The lecture was delivered in the straightforward manner typical of Lord Charles, and the chief points of his speech were the small pay and the extremely slow promotion of the executive officers of the Navy. He said the Navy, as a profession, was the only one in which the pay and prospects did not improve as the responsibilities increased. He dwelt at some length upon the condition of the lieutenants, who, after twelve years' service, only got £21 monthly, and gave it as his opinion that our admirals should be chosen from younger men. The speech would have done justice to a thoroughly disappointed naval officer. The public hear from time to time that the pay of naval officers is somewhat poor, but the speech of Lord Charles must have thoroughly opened the eyes of his audience. In these peaceful days prize money is a thing of the past, and so it is impossible for an officer to increase his emoluments that way, so the great majority have only their service pay to fall back upon. The speaker asserted in the most emphatic manner, that, if he had his time over again, nothing would induce him to enter the Navy, and such a statement, coming from so successful and distinguished a member of the Naval profession, must not be treated lightly. A great many of Lord Charles' remarks, especially in regard to leave and things of that kind, refer as much to engineer as to other officers and no doubt at some future time we shall have his opinion on

the points in question, in reference to the engineering branch of the Navy, a speech which would certainly be read with the greatest interest by all concerned.

Sheerness Dockyard.

Work on the cruisers *Proserpine* and *Pomone* proceeds very slowly, and at present has nearly ceased altogether, owing to the men being required for the purposes of refitting other vessels destined to take part in the great Review. The finishing touches have been put to the yacht *Wildfire*, and she is now out of hand and presents an exceedingly smart appearance. The *Gleaner's* defects have been made good and she will now take part in the mobilisation. Provision for her refit was made in last year's Estimates, but until recently she was never taken in hand. The *Pelorus* made two long runs at sea in order to test her boilers and her last commissioned trial was most satisfactory, her engines and boilers coming through the ordeal successfully. It is expected that she will be finally attached to Devonport for manning and refitting purposes. In spite of the fact that the *Swallow* had to be finished off in such a hurry, she passed through her trial in a way which pleased everybody, all those responsible. She is to be ready for the pennant by the 20th of this month, but in order to accomplish this she will have to be refitted and cleaned at one and the same time. The destroyer *Sturgeon* is in dock here, in consequence of an accident which has happened to one of the brackets of her propeller shafting. The course which is generally adopted when these boats get out of order of turning over their crews to other destroyers in the Reserve is one to be commended, for it prevents any cessation of the training of the engine-room ratings in the use of water-tube boilers, which has frequently happened; this was done in the case of the *Desperate*, *Swordfish*, and *Spitfire*, doing duty while the *Salmon*, *Snapper*, and *Sturgeon*, were under repair.

The Launch of the "Andromeda" and "Pyramus."

The fourth of the new type of first-class cruisers designed by the Chief Constructor of the Navy, has been launched at Pembroke Dockyard. Lady Scourfield broke the customary bottle of wine across the bow, and a few minutes afterwards the vessel moved slowly down the slips into the water. She is 435 ft. long, 69 ft. in breadth, and has a mean load draught of 25 ft. 3 in., and displacement of 11,000 tons. She is built of steel throughout, and below the main and upper decks has a steel protective deck covering the whole length and breadth of the ship and enclosing the most vulnerable parts. Her machinery was designed by Mr. A. J. Durston, the Engineer-in-Chief of the Navy, and the construction of it was entrusted to the well-known firm of Hawthorn, Leslie & Co., and is now very far advanced. The *Andromeda* is to be driven by twin-screws driven by two sets of vertical triple-expansion engines, and there are four cylinders to each set of engines. The steam for all purposes is generated in thirty water-tube boilers of the Belleville type, grouped in four boiler-rooms, each of which forms a separate watertight compartment, and is fitted with three sets of electric lights. It is expected that she will be ready for her steam trials about the beginning of next year. She has a powerful armament, consisting of sixteen 6-in., sixteen 12-pounders, and twelve 3-pounders, all quick-firers, seven machine guns, and three Whitehead torpedo-tubes. She has a coal bunker capacity of 1,000 tons which can be doubled if necessary. The *Pyramus*, a third-class cruiser of the *Pelorus* type, has also been launched from Palmer's Shipbuilding Works. Her dimensions are practically the same as the last-mentioned ship, and her armament will consist of eight 4-in. and eight 3-pounders (quick-firers), three Maxims, and two 14-in. torpedo-tubes. The launch was carried out to the complete satisfaction of everyone.

Devonport Dockyard.

As at all the other yards the pressure of work here in connection with the Spithead Review is tremendous, for nearly a fourth of the ships taking part therein will be furnished from this yard. The officials here could not have chosen a more inopportune time than the present, when there is such a great demand upon the docking accommodation of the port, in which to enlarge one of the big docks. The present anchorage space is little enough considering the number of ships in want of attention. The dearth of naval mechanics is causing some little consternation here, and but a weak response has been made to the call for blacksmiths, stokers, shipwrights, and others, despite the prospects which are held out of steady employment. What is wanted is better terms in respect to pay and advancement. The opportunity which the Ship Constructive Association took of reminding the Admiralty of this, and that, almost half of the established dockyard shipwrights earn only two shillings more than was paid them, or their fellows, over a score of years ago, is regarded here as a step in the right direction. Undoubtedly a scarcity exists in men of this trade, and taking all things into consideration, they are certainly entitled to better conditions than they are at present working under. Work is proceeding briskly on almost every vessel building or repairing here. The two battleships *Renown* and *Hannibal*, several cruisers and torpedo-boat destroyers are in the completing stage, and many coastguard and portguard ships are undergoing repair that they may present a good appearance at the Review. The necessary repairs to the battleships *Magnificent* and *Blake* and the cruisers *Hermione*, *Bellona* and *Halcyon*, are being attended to as rapidly as possible and the *Howe* and *Thunderer* are here for their annual refit. In spite of all this very few men are working overtime, and the various vessels are approaching completion with astonishing rapidity. This praiseworthy state of affairs is due to some extent to the forethought of the officials.

The Russian Navy.

From all accounts the new Russian battleship *Navarin* is a very good specimen of her class. She is a typical Russian battleship—armoured out of all proportion to her size, and armed in exactly the same way. For a vessel of only 9,476 tons her armament is almost as heavy as our own *Royal Sovereign* type It is reasonable therefore, that with such a huge proportion of offensive and defensive qualities that other usually indispensable qualities must have been sacrificed in order to obtain these and at the same time ensure her efficiency as a fighting ship. The new vessels now under construction for the Russian Government include the one battleship, the *Osslyaba*, one first-class cruiser, one gunboat, and one armoured coast defence vessel at the new dockyard at St. Petersburg, two cruisers at the galley ports, and one battleship and one cruiser at the Baltic works. There is a cruiser also building in France, and two torpedo cruisers and fifteen torpedo boats are also under construction at the same place. Many other important additions are in contemplation. The Russian Minister to the United States at Washington, acting on instructions from St. Petersburg, has invited the Illinois Steel Company to tender for the supply of armour plates for the above vessels.

Accidents in the French Navy.

Many accidents have occurred in the French Navy during the past few weeks, the most serious of which was that which ended fatally on board the *Hoche*, while some trials were in progress in connection with the hoisting and lowering of her steam vedette. This had been safely floated several times, and another trial was being made when a staple ring gave way, causing the vedette to plunge head foremost into the water. It came into contact with one of the *Hoche's* guns, and was somewhat seriously injured thereby. One of the four men on board was killed, one has his ribs broken, and another sustained a fractured leg, while the fourth one escaped uninjured. A mishap similar to that which happened on board the *Theseus* also befell the *Jaureguiberry*. While firing a torpedo from a submerged tube, an air chamber exploded just as the missile had left the vessel. Fortunately nobody received any injuries, and the only damage to the ship was that the guide bar, which keeps the torpedo in its proper course, was very much bent. The unfortunate *Fleurus*, too, has had another breakdown with her present boilers. She has been out of the builders' hands since 1893, and her trials have extended over the last four years. It is well that these things are managed better over here. The naval Press of France is beginning to complain of the inordinately long time the warships of that country are under trial. The *Magenta* was seven months, and the *Martel*, *Carnot*, *Jaureguiberry*, *Bugeaud*, and *Latouche Treville* nearly twelve months being officially tested. A small flotilla of destroyers could have been built with the money thus expended upon these ships.

New German Warships.

The new second class cruiser the *Hertha* has just been launched at Stettin, from the Vulcan Works, for the German Navy. She is built entirely of steel. She is 350 ft. long by 57 ft. 10 in. beam, has a mean draught of 26½ ft., and a

displacement of 5,650 tons. She has three screws driven by three separate engines of 10,000 I.H.P., capable of producing a speed of a little over 18½ knots. Her coal capacity is 500 tons at normal draught. Her armament will consist of thirty-four guns and three lance torpedo tubes. Her crew will number 439 all told. Although she will not attain the speed of 22 knots, steamed by the *Kaiserin Augusta*, the *Hertha* and her sister ships are considered likely to prove more serviceable in action than this ship. The new cruiser *Freya*, so christened by the Queen of Wurtemberg, has also been launched at Dantzig. She is to replace the old vessel of the same name. Prince Henry of Prussia made a short speech and then tied the ribbon, with the name *Freya* embroidered on it, round Her Majesty's arm, the band meanwhile playing the German National Anthem. The actual launch went off very smoothly and the function was attended by many great naval and military authorities.

Pembroke Dockyard.

The work on the three warships building here progresses with all possible rapidity. The *Andromache* is at present having the least amount of work put into her, a number of the workmen engaged on her having been transferred to the *Hannibal* in order to get her ready for her departure from here. A little over half a hundred shipwrights and an equal number of other workmen are all that are left on the *Andromache* now. Owing to the great efforts made with the *Spartiate* almost a complete skeleton of her can now be seen. She was only laid down in the slip two or three weeks ago, and already a great deal of the framework below the protection deck in the central part has already been built into her. Much comment has been caused by the dirty, insanitary state of the *Hannibal*. The heaps of filth lying about the ship gave it this name in the first place, and a while ago there was a slight improvement, but even now there is plenty to be done before she will be clean and sweet. She is certainly behind her sister ships, but this may be accounted for by the few men which have been working on her lately, and taking everything into consideration her progress has been very fair. A good deal of work will have to be put in on her decks and lower parts, and her casemates are very backward. She is due at Portsmouth in the first week of September. The preparation of vessels to take part in the Jubilee array of battleships has mostly been entrusted to other yards owing to the better dock accommodation obtainable. But there is plenty to do for all here.

The Queen at the Cyclops Works at Sheffield.

It can easily be supposed that one of the most vivid recollections Queen Victoria will have of her Diamond Jubilee will be her visit to Sheffield and the sight she witnessed in the great armour-plate works of Messrs. C. Cammell & Co. At a distance of about 25 yards she witnessed a mass of white hot metal, 35 tons in weight, and with a thickness of 24 in., rolled out until it was nearly double its original size, in fact, the making of an armour plate for the new battleship *Ocean*. It is possible that the plate, if it is finally decided that it shall form part of the armament of the great battleship, will be marked in some way so as to single it out from its fellows. Never in her life before has Her Majesty witnessed such an event. The Queen and Princess Christian, who accompanied her, had to be provided with coloured glass screens, and the heat, even at the distance the royal carriage was from the furnace, must have been perceptibly felt by its occupants. The royal party watched the great doors of the furnace drawn up and the men advance to the furnace. The great grappling instrument clutched hold of the mass of metal inside the fire and in a short time dragged out the great glowing mass. The heat at this time was so great that spectators 20 yards off were obliged to turn their faces away. But the workmen, who were specially attired in neat blue and white uniform for the occasion, finally hauled the great block of steel to the rollers, under which it was placed. When it left them it was about double in size on the surface to what it had been when it entered. This ended the spectacle so far as Her Majesty was concerned, and the royal party, after the usual speech-making and thanks, drove off to the special platform at the rear of the Cyclops Works.

Institute of Marine Engineers.—The seventh annual dinner of this Institute, will be held at the Holborn Restaurant, on Wednesday, June 2nd. The President, J. Fortescue Flannery, Esq., M.P., will occupy the chair.

Miscellaneous.

J. P. Hall & Co.—We have received a catalogue of dynamos, motors, and combined engines and dynamos from Messrs. J. P. Hall & Co., electrical and general engineers, of Black Riding Iron Works, Werneth, Oldham. The catalogue is illustrated by a large number of excellent plates, illustrating the various machines and combined plants made by the firm. A special feature which is included in the engines of this firm is a patent automatic expansion fly-wheel governor, which is fitted to and driven by the shaft direct, the operation of the governor being direct upon the valve eccentric to alter its motion so as to obtain various ranges of expansion in the cylinder.

Messrs. Holden & Brooke, Limited, of Sirius Works, West Gorton, Manchester, have forwarded to us an abridged catalogue of steam users' specialities, which include steam driers or anti-primers, steam traps, patent reducing valves, one-seat equilibrium valves, ejection valves to prevent damage by the action of a water-hammer, exhaust steam injectors of various patterns, back pressure valves, foot valves and strainers, self-acting injectors, water lifters, elevators, bilge ejector, silent steam heaters, and Brooke's patent thermo-regulator, which is an apparatus for heating liquids and maintaining them at a predetermined uniform temperature. The catalogue is illustrated by a number of plates, some giving sectional views of the apparatus.

Messrs. Mosses & Mitchell have forwarded to us their last published lists of patent vulcanized fibre goods, which have been issued by them to the public. These lists include particulars with reference to air and circulating pump valves, compression cock washers, carriage axle washers, saddle staples for use as insulators in fastening electric light, telephone and other electric wires, dust guards and oil-box covers for the journal boxes of railway carriages, and many other articles too numerous to mention, in the manufacture of which this very useful material is employed. The fact that the fibre is not deteriorated by hot or cold water, Crane's or other oil, so destructive to rubber, gives this product its deserved prominence among the users of this class of goods.

Dover-Ostend Service.—The growth of this route in popular favour has been so considerable that the Belgian Government has again added to its fleet another high-class passenger steamer, the *Princesse Clementine*. The service now numbers nine modern paddle steamers. The three first vessels of a smaller type are 270 ft. long—*Prince Albert*, *Ville de Douvres*, *La Flandre*, speed 19 knots with 4,500 H.P. The three middle-class type are 300 ft. long—*Princesse Josephine*, *Princesse Henriette*, *Rapide*; speed 20½ knots with 6,000 H.P. The three largest type are 340 ft. long.—*Leopold II.*, *Marie Henriette*, *Princesse Clementine*; speed 22 knots with 6,000 H.P. The *Princesse Clementine* is the finest and handsomest of all the fleet. She has an extra promenade deck, which will be much appreciated by passengers who like fresh air. Her cabin fittings and furnishings are carried out in the most luxurious and comfortable manner by some of the very best Flemish artists and art furnishers. The decorations are superior in taste and execution to anything yet afloat. The trial of this steamer took place recently on the Clyde, in the presence of the Belgian Government officials and the staff of the John Cockerill Co., of Seraing, the builders. Under most unfavourable conditions of wind and weather, she made 22·18 knots, just the same as the *Marie Henriette* by the same builders, which obtained 22·19 knots. These two steamers therefore hold the record of speed for paddle steamers.

A Novel System of Launching.—Messrs. Yarrow & Co. have recently completed the construction of a large shallow draught stern-wheel steamer for the Russian Government. It was shipped in pieces from London, and put together on one of the Russian rivers in East Siberia. The erection of the vessel, and the riveting up and completion of it, were carried out on the ice during the last winter months, and on the breaking up of the ice the vessel simply lowered itself into the water.

The Austrian Government have determined, as the result of exhaustive experiments, to fit the Yarrow boiler in the cruiser now building at Pola, of 8,000 H.P. There will be eight boilers in all, having 2,500 ft. of heating surface each boiler. These boilers, as well as the machinery for the vessel, will be constructed by the Stabilimento Tecnico, Trieste.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from April 26th to May 26th, 1897 :—

Anderson, John A., assistant engineer (temporary), to the *Empress of India*, to date June 8th.

Andrews, Robert W. B., assistant engineer to the *Empress of India*, to date June 8th.

Barnes, B. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Barnes, Benjamin J., fleet engineer to the *Mars*, to date June 8th.

Barnett, Horatio S., acting engineer to the *Wildfire*, additional for Dockyard Reserve, Sheerness, undated.

Barr, Ernest, engineer to the *Mars*, to date June 8th.

Bermingham, C. H. A., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet.

Blundell, S. H., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Boothroyd, H. T., engineer, has been promoted to the rank of senior engineer.

Bushby, John F., assistant engineer to the *Royal Sovereign*, to date June 8th.

Butland, James T. C., assistant engineer to the *Victorious*, to date June 8th.

Carlisle, Archibald H., assistant engineer to the *Renown*, to date June 8th.

Carter, Edgar O. (probationary), assistant engineer to the *Empress of India*, to date June 8th.

Charlton, Francis J., assistant engineer to the *Powerful*, to date June 8th.

Chase, John E., fleet engineer to the *Royal Sovereign*, to date June 8th.

Chope, William D., engineer to the *Barracouta*, to date June 8th.

Christian, Thomas W., engineer to the *Victory*, additional for the *Hunter*, undated.

Cocks, Herbert W. L., assistant engineer to the *Mars*, to date June 8th.

Crawford, William R., assistant engineer to the *Jupiter*, to date June 8th.

Crichton, Peter T., engineer to the *Pembroke*, to date May 10th, and afterwards to the *Swallow*, in lieu of a chief engineer, to date May 20th.

Croisdale, Louis R., assistant engineer to the *Victorious*, to date June 8th.

Dawson, William (probationary), assistant engineer to the *Jupiter*, to date June 8th.

Dixon, William J. (probationary), assistant engineer to the *Renown*, to date June 8th.

Dowling, Horace E. (probationary), assistant engineer to the *Powerful*, to date June 8th.

Drake, Sidney J., engineer to the *Wildfire*, for the *Swordfish*, to date April 22nd.

Drought, A. E., acting engineer to the *Wildfire*, additional for service in the Reserve, to date April 30th.

Dunn, Charles F., engineer to the *Howe*, to date June 8th.

Durston, Arthur S. W. (probationary), assistant engineer to the *Renown*, to date June 8th.

Edwards, Robert W., fleet engineer to the *Powerful*, to date June 8th.

Ellis, Edgar H., engineer to the *Powerful*, to date June 8th.

Featherstone, W. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Flood, Frederick J., chief engineer to the *Phæton*, to date June 8th.

Gibson-Sugars, John S., engineer to the *Wildfire*, for the *Desperate*, to date April 22nd.

Glasspole, W. H., acting engineer, has been confirmed in the rank of assistant engineer in Her Majesty's fleet.

Grazebrook, Robert H., assistant engineer to the *Mars*, to date June 8th.

Gregg, Charles J., assistant engineer to the *Phæton*, to date June 8th.

Gush, Arthur S., assistant engineer to the *Victorious*, to date June 8th.

Ham, William H. (probationary), assistant engineer to the *Mars* to date June 8th.

Henwood, J. W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hicks, J. A. H., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Howell, Llewelyn, assistant engineer to the *Powerful*, to date June 8th.

Huddy John B., engineer to the *Renown*, to date June 8th.

Jackson, Thomas P., engineer to the *Leander*, to date June 8th.

Jacob, C. R., assistant engineer, has been placed on the retired list of his rank.

Jenkins, John C. (probationary), assistant engineer to the *Phæton*, to date June 8th,

Jennings, R. S., engineer to the *Pembroke*, additional for the *Cheerful*, in lieu of a chief engineer, to date April 30th.

Jones, John, staff engineer to the *Jupiter*, to date June 8th.

Jose, Francis W. R., engineer to the *Renown*, to date June 8th.

Kerswell, George T., engineer to the *Victorious*, to date June 8th.

King, Q. W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Lawrence, William G., assistant engineer to the *Jupiter*, to date June 8th.

Lonnon, William, staff engineer to the *Victory*, to date May 15th.

Ludlow, George T. J., chief engineer to the *Magdala*, to date April 30th.

Maconochie, Archibald W. (probationary), assistant engineer to the *Leander*, to date June 8th.

Moore, Francis J., fleet engineer to the *Victorious*, to date June 8th.

Moore, Walter L., assistant engineer to the *Barracouta*, to date June 8th.

Morrison, Frank (probationary), assistant engineer to the *Royal Sovereign*, to date June 8th.

M'Whannell, R., Royal Naval Reserve, is appointed engineer.

O'Neill, John, engineer to the *Empress of India*, to date June 8th.

Pallot, Elias G. (probationary), assistant engineer to the *Empress of India*, to date June 8th.

Parry, Herbert L. (probationary), assistant engineer to the *Jupiter*, to date June 8th.

Parsons, William G., fleet engineer to the *Empress of India*, to date June 8th.

Patterson, G. T., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet.

Peel, Henry C. W., engineer to the *Royal Sovereign*, to date June 8th.

Pibworth, W. H., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Pill, J. H., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Richards, Percy B., assistant engineer (temporary), to the *Royal Sovereign*, to date June 8th.

Ryder, John F., fleet engineer to the *Vivid*, additional for the *Æolus*, to date April 25th.

Sharp, William, fleet engineer to the *Vivid*, additional for the *Spartan*, when paid off, undated.

Sheen, Charles C., engineer to the *Powerful*, to date June 8th.

Shirvell, James J., assistant engineer to the *Powerful*, to date June 8th.

Silk, Ethelbert S., engineer to the *Wildfire*, additional for the *Sturgeon*, to date June 8th.

Sillince, William P. (probationary), assistant engineer to the *Victorious*, to date June 8th,

Simmons, F. T. (probationary), assistant engineer to the *Mars*, to date June 8th.

Smith, Frederick T, assistant engineer to the *Pembroke*, supernumerary, to date May 15th.

Soper, Thomas H, assistant engineer to the *Renown*, to date June 8th.

Spencer, Arthur P. S., assistant engineer to the *Victory*, supernumerary, to date May 5th, and to the *Jason*, to date June 8th.

Spry, Frederick M. D., chief engineer to the *Vivid*, additional, for the *Raleigh*, undated.

Stearn, Walter T., engineer to the *Pembroke*, additional for the *Jupiter*, to date April 22nd.

Stearn, Walter T., engineer to the *Jupiter*, to date June 8th.

Sydenham, Ernest D. (probationary), assistant engineer to the *Royal Sovereign*, to date June 8th.

Tuckwell, Henry M. S., assistant engineer to the *Spanker* (lent), to date April 27th.

Wall, Lewis, engineer to the *Powerful*, to date June 8th.

Wallis, Henry, chief engineer to the *Leander*, to date June 8th.

Wallis, W. A., engineer to the *Victoria and Albert*, to date May 11th.

Watson, Alfred D., staff engineer to the *Renown*, to date June 8th.
Wells, F. W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Willoughby, James T., engineer to the *Pembroke*, additional for the *Salmon*, to date April 22nd.

HOAR & BROWN'S HARDWOOD MARKET REPORT, MAY 24th, 1897.

TEAK.—During the first three weeks of this month there have been 1,357 loads of logs landed, and 380 loads of planks, the deliveries being 1117 loads logs and 319 loads planks. These figures will leave the stock practically in the same state as it was at the end of April, which is smaller than for many years past.

The present position of the market may be described as satisfactory. Enquiries are frequent and prices well maintained, especially for good merchantable wood. The stock of first-class teak is just now very small indeed, and the conditions of the parcels arriving by steamer go to show that the stock of good timber at port of shipment must be very scarce, to account for the inferior shipments now being made.

The demand for planks continues very brisk, and as the stocks are depleted prices advance accordingly. The present position is likely to remain unchanged for some considerable time.

MAHOGANY. Honduras and Tobasco.—A very large quantity, mostly of inferior character, has changed hands during the month. As the wood has gone into consumption without showing any marked reduction in price, it would appear that the present position of the market is a very sound one. Good wood for panel and board purposes is in very strong demand, and meets with ready purchasers at remunerative figures.

CUBA rules very high in price, and is likely to continue so for some time to come. Small logs, which were practically unsaleable some few months ago, are now eagerly bought up. MEXICAN.—There have been considerable importations of this wood, mostly of small and inferior character. Prices realized may be considered satisfactory, looking at the condition of the wood. AFRICAN.—This wood appears to be growing into favour, probably on account of being well squared; and buyers are enabled to secure larger and better made timber than is the case with other qualities of mahogany at equivalent prices.

AMERICAN HARDWOODS.—The stocks of Black Walnut are small, and prime logs and boards are very much wanted. Holders of this class of wood are asking very high prices, which make sales somewhat difficult. OAK.—The stock is heavy, but as the demand is fairly good prices have been maintained.

KAWRIE PINE.—As it is now some time since there have been any imports of this wood, stocks are small and prices show a slight increase.

Business generally during the month has been active, but the outlook for June is not quite so promising, as it is anticipated that the Jubilee festivities will restrict business during the week or two they are in operation.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

SHIPBUILDERS and engineers have every reason to be satisfied with the work in hand, and with the number of contracts placed during the present month. Yet with such a fair outlook, a labour war seems imminent, there being now little chance of a crisis being averted in the engineering trade. We mentioned in our last issue that although the conference held in London between representatives of the Employers' Federation of Engineering Associations and the Amalgamated Society of Engineers was closed, correspondence would still pass between them on the machine question. The employers' held a meeting at Carlisle, when they decided to send a letter to the secretary of the A.S.E., which went very fully into the circumstances which led to the dispute, and the reasons why they could not concede to the A.S.E. in the demand for the employment of their members (and artisans of equal standing) on all machines however simple, considering the number of other societies and men of no trade society, rendered it imperative that the employers, in the national interest, should be free to encourage ability wherever they may find it, and free also to select the most suitable men for the various operations carried on in their workshops. The A.S.E. sent a lengthy reply to this letter, going over the same ground and furnishing abundant material for discussion, leading up to the contention that the sole object of the A.S.E. is to maintain a high standard of wages, not for themselves alone, but for all employed in the engineshops and at machines. In the proposal for the settlement of the dispute at Pallion which brought the controversy to a climax, they suggest a joint-committee of employers and employed to inquire into that case and "settle the wage to be paid for the working of the machine in question." The employers, in reply, reaffirmed their position more concisely than before, and assert their right to employ such men as they deem competent, and at such wages as they and the men employ mutually arrange, for the management of machines in the engine shops, thus the question is left in abeyance. No employer of labour could possibly agree to the demand of the A.S.E., the absolute unreasonableness of such a proposition is seen from the first.

The dispute between Messrs. James Howden & Co., Scotland Street, Glasgow (the patentees of the well-known system of forced draught), and the members of the A.S.E., has been settled, the men resuming work on May 10th. The dispute was against the employment at a machine of a man whom they considered "unskilled," and in the matter of wages they said the prices paid are below the average of the district. The machine in question is not now working, although the firm do not admit that it has been stopped solely by reason of the strike of engineers, and in some cases advances of wages have been promised.

The agreement under which the engineers are working, terminates on June 12th, and both in the Clyde and Belfast districts they have applied for an advance of wages. The men in the upper reaches of the Clyde ask for an advance of ½d. per hour, which on the present working hours is equivalent to 2s. 3d. per week. Those in Greenock have asked for ¾d. per hour. The masters will in all probability insist on treating all the districts alike.

Shortly before three o'clock in the afternoon of May 17th a fire was discovered to have broken out on the first-class cruiser *Argonaut*, at present under construction in the Fairfield Shipbuilding yard, Govan, considerable damage being done to the vessel. The outbreak is supposed to have originated through a hot rivet falling from the bow of the vessel on to a tarpaulin which was spread over some shavings, chips, pieces of wood, and other inflammable material.

On May 15th, in the presence of a large gathering of ladies and gentlemen, the new marine biological station at Millport was formally opened. The building, which has been erected and equipped at a cost of about £1,500, is situated at Keppel Pier, and will be known as the Robertson Museum.

Negotiations are proceeding, we understand, for the lease of 25 acres of ground near Renfrew. The promoters are said to be German and English capitalists, who will erect large general engineering works. They are interested, it is said, in some patents for boiler and boiler-tube making.

Mr. H. L. B. M'Calmont, M.P., has been elected a director of the Fairfield Shipbuilding and Engineering Co.

Messrs. Wm. Hamilton & Co., shipbuilders, Port-Glasgow, have received an order to build a steel screw steamer of 6,000 tons for the East Asiatic Co., Limited, Copenhagen, and is intended to trade between home ports and the far East. She will be fitted up in a superior manner for passenger as well as cargo-carrying. The decks will be of teak wood, and the steamer will be lighted throughout with electricity. Refrigerating compartments will be constructed. Messrs. David Rowan & Son, Glasgow, will supply the steamer with triple-expansion engines. Messrs. Wm. Hamilton & Co. have also booked an order to build a steel screw steamer of 5,000 tons register.

Messrs. Murdoch & Murray, shipbuilders, Port-Glasgow, have received an order for another steel twin-screw steamer for passenger and cargo service on the river Amazon. Messrs. David Rowan & Son, Glasgow, will supply the steamer with triple-expansion engines. The vessel is to replace the *Cidade de Manaos*, built by them, and recently lost on the Amazon through collision. Messrs. Murdoch & Murray have also secured a contract from the Mersey Docks and Harbour Board to build two steamboats for the pilotage service of the port, to

cost about £17,000. Last year they supplied two steam pilot boats to the Board, and these have given so much satisfaction that it has been resolved to provide another two of a similar character, and do away entirely with the old sailing vessels for pilotage purposes.

Messrs. Russell & Co., shipbuilders, Port-Glasgow, have received an order to build for Spanish owners, a steel screw steamer for passenger and cargo service, she will be similar to the *Langbank* built some time ago at Kingston yard, and will register about 6,000 tons. They have also laid down the keels of two 5,000 ton steamers.

Messrs. Robert Napier & Sons, Limited, Govan, have contracted to build and engine three steamers, each 375 ft. long and 6,000 tons, for the Nippon Yusen Kaisha, of Japan. The vessels will be fitted with triple-expansion engines by the builders at their Lancefield Engine Works. They have also under way, three steamers for the Roumanian Government, and another vessel of considerable tonnage, which should keep the works of the firm well employed for some time.

Messrs. Ramage & Ferguson, shipbuilders, Leith, have secured an order to build a steamer, 370 ft. in length, the largest vessel ever undertaken on the banks of the Forth.

Messrs. Alex. Stephen & Sons, shipbuilders, Linthouse, have contracted to build and engine two large cargo carrying steamers, for the British India Steam Navigation Co., Limited. The vessels will each be over 400 ft. long.

Messrs. Carmichael, McLean & Co., shipbuilders, Greenock, have contracted to build for Continental owners, a steel well-deck steamer, to carry 1,200 tons.

Messrs. Paul Jones & Son, yacht builders, Greenock, have secured a contract to build for a gentleman in Skye, a 25 ft. launch, to be propelled by motor power.

Messrs. The Caledon Shipbuilding Co., of Dundee, have received an order to build for Messrs. Wilson's cross-Channel service, a passenger and cargo steamer.

Mr. A. Munro, yacht builder, Ardrishaig, has booked an order for a boat for Mr. Fraser, Achiltibuie, Ross-shire. He has also laid the keel of a 9 ton yacht to the order of a Belfast gentleman.

Messrs. Denny & Co., of Dumbarton, are supplying new machinery to the Allan liner *Sardinian*, which was docked on May 1st, in the Leven shipyard, for an overhaul.

Messrs. Kincaid & Co., engineers, Greenock, have secured an order to supply the engines and machinery for the steamer being built for service on the river Amazon, by Messrs. Russell & Co., Port-Glasgow.

Messrs. Wm. Beardmore & Co., Parkhead Steel Works, have, we understand, been successful in securing orders for the gun casemates for the three first-class cruisers being constructed for the British Admiralty. One at Fairfield, one at Clydebank, and the other at one of the Government dockyards. This order ensures activity in the gun casemate department at Parkhead for the next twelve months. Messrs. Beardmore & Co., are also reported to have purchased all the plate mill and cogging mill plant belonging to the Wear Steel Co., Sunderland, part of which will be transferred to the Parkhead works.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—Within the past month no change of importance has taken place in the condition of the shipbuilding trade, and though most of the yards continue brisk on the strength of orders booked last year, very little new work has been negotiated. Even in the dullest times, orders for vessels required for special services are given out, and a few transactions of this kind have been carried out with builders on the Tyne and in other districts lately; but this is no more than what might have been expected, and there is nothing in it to justify the optimist view which, in some quarters, seems to be entertained. The officials of the big trade unions are jubilant because, for the moment, all their members are employed; and though wages rates have already been so far advanced, that in some trades they are considerably beyond the rates of any former period, it is by no means unlikely that further demands may be made. The industry cannot bear the strain, however, of any further forcing up of wages, and if such an experiment is attempted, there is hardly a doubt that it will be met with a firm resistance by the employers. With freights in their present depressed state, the cost of new vessels must be lowered rather than raised before demand can be stimulated, and unless some unexpected turn of events should operate favourably on the freight market, the prices of new tonnage are, in the very near future, likely to undergo a process of shrinkage. Between the 15th and the 18th of the present month (inclusive) no less than four war vessels having an aggregate displacement of over 15,000 tons, were launched on the Tyne—two by Messrs. Armstrong, Whitworth & Co., and two by the Palmer Shipbuilding and Iron Co., Limited. The latter firm also launched within the dates specified, a splendid cargo boat, capable of carrying 8,000 tons. To launch three vessels of such importance within the limited space of time mentioned, is a feat hitherto unsurpassed, if equalled, by any shipbuilding firm in the world, and it is an achievement of which the management of the Palmer Co. may well be proud. There is something else, however, upon which they are to be congratulated, and that is the exceptional productive capacity shown by the ability to turn off ten warships, as well as a number of big merchant ships, in little more than twelve months. About this time last year, the keels were laid in the company's Howdon yard, for two cruisers of the second class, and the first lot of eight torpedo destroyers, ordered by the Admiralty; and the whole number have now been put off the stocks, leaving that supplementary establishment again untenanted. It is to be hoped that the berths will not long remain unoccupied; for the "laying in" of this yard, even for the briefest period, is a calamity of no small magnitude to the immediate neighbourhood. The two warships launched by Messrs. Armstrong, Whitworth & Co. are for the Chilian and Japanese Governments respectively, and are both very fine examples of modern design and workmanship in the department of naval architecture. The company have several other warships in course of construction at their Elswick and Low Walker yards, and all of these, it is understood, are for foreign Governments.

Messrs. C. S. Swan & Hunter have made quite an extraordinary progress with the building of the large pontoon dock which they laid down in the recently acquired yard adjoining their old establishment. Judging by the rate of progress already made, the contract will be completed in less than two months from the present time, and this achievement, we think, will establish a record so far as regards rapidity of execution in this kind of work. In the shipyards belonging to the firm, business continues brisk, all berths being occupied, and the frame furnaces being kept in steady operation.

Messrs. Hawthorn, Leslie & Co.'s yard has an unusually bare appearance just now, though as the firm have work to proceed with, a change for the better may soon be witnessed. There are three foreign ordered steamers being fitted out in the river, and on these a large number of men are employed. Messrs. Stephenson have a fair amount of work in progress, consisting of a pontoon dock and a couple of steamers, besides some dock gates or caissons. It is understood that the firm are negotiating for some further work of the latter class.

Messrs. Wigham Richardson & Co. are said to have booked one or two orders within the month, and their building berths are pretty fully occupied with vessels of a special class. In the waterway facing the yard, two recently-launched steamers are receiving their equipments. The frame furnaces are in full operation, and for some time past the deliveries of material from the rolling mills have been unusually large.

Messrs. Wood & Skinner have three vessels on the stocks, one of them being of rather large dimensions, and it is understood that there is other work to follow. At Messrs. Dobson & Co.'s yard two berths are vacant; but the two vessels on the stocks are in early stages, and will provide work for the operatives until other contracts have got beyond the preparatory stage. The Tyne Shipbuilding Co.'s yard is still well employed, the vessels building being of large size, while in the river a very fine cargo boat, ordered by Messrs. Wm. Milburn & Co., is being got ready for sea.

Messrs. Readhead launched a vessel for French owners on the 14th inst., and the keel for another was immediately placed in the vacated berth. There are three other vessels on the stocks, all of them being of large dimensions. At Messrs. Eltringham's yard there are four small vessels in progress, and at other yards where small craft are built, business is pretty good.

The graving docks are, almost without exception, occupied with vessels undergoing painting or repairs.

Engineering.—The month has passed without any further conference taking place between the associated employers and the representatives of the Engineers' Society; but correspondence has passed between the parties which shows a change of front on the part of the latter, while the employers have adhered with commendable firmness to the position originally taken up by them. The engineers now say that they merely want the wages to be kept up, and that it is far from their purpose to claim an exclusive right to the working of any class of machines in engine shops. They make it sufficiently plain, however, that they want to regulate the wages, not only of their own members, but of other workmen, and this is an assumption with which, of course, the employers could not be supposed to acquiesce. As the case now stands, a lock-out is pretty certain to take place, unless the engineers unequivocally disavow all intention of making further encroachments upon the employers' prerogative, and prove their sincerity by withdrawing the preposterous claim put forward by them with regard to the fixing of other men's wages. The employers have borne a good deal, but they felt themselves compelled to turn when an attempt was made to supercede their authority in their own works, and now that they have turned, it is satisfactory to see that they will admit of no further trifling with their rights. In the interests of the country, and of the working classes generally, the members of the big trade unions must be taught to keep within their legitimate line of action, which is, to get the best conditions they can for themselves without trenching upon the just rights of others. They are too apt to forget that the world was not made exclusively for them, and that there are a great many other people who have to be considered.

The state of business in the engineering establishments is still very good, the works of Messrs. Hawthorn, Leslie & Co., St. Peter's, and Forth Banks; Messrs. Armstrong Whitworth & Co., Elswick; and the Palmer Co., Jarrow, being the busiest. The Neptune Works, Low Walker, are also very full of work, and at Messrs. Readhead's establishment the briskness that was noticeable at the beginning of the year is well maintained.

The North-Eastern Marine Engineering Co., Wallsend, have just completed an important alteration contract on the s.s. *Unity*, formerly owned by a Tyneside firm; but which has lately passed into the hands of Messrs. Reed, McNair & Co., of Glasgow. The alterations involved the substitution of a new high-pressure boiler for the old boilers, a change which will considerably increase the carrying capacity of the vessel; and a reconstruction of the engines on the high-pressure compound principle, with all the latest improvements. On an experimental trip which was made on the 21st inst., preparatory to the vessel's proceeding to Cronstadt with a cargo of coals, the most satisfactory results were obtained in the shape of a high rate of speed against a heavy sea, the engines working smoothly, and without vibration. The representative of the owners—a well-known engineering expert—was on board during the trial, and expressed his great satisfaction with the manner in which the work had been carried out.

The extensions which are being made at the Wallsend Slipway Co.'s works are now beginning to assume concrete shape, and a good idea may be formed of the proportions they will ultimately reach. These works have held no small place in the engineering history of the Tyne since their inception a quarter of a century ago, and within the past decade such improvements have been made on the plant and surroundings, as have entitled them to quite a foremost position among local works. Much as has been done in the past, however, to assure for the establishment the largest possible degree of prominence and success, it will probably appear small in comparison with what is now being done in the direction of further development.

The works of Messrs. Walker, Emerson and Thompson Brothers continue to be kept exceedingly busy on ships' windlasses, capstans, anchors, and other accessories of equipment, while at the Dunstan Engine Works (in proximity to the new coal shipping staiths of the North-Eastern Railway Co.) business is very active in repairs to colliery plant, steamships, &c. Messrs. Baird & Barnsley, North Shields, have some good contracts in hand, and the smaller engine works on the south side of the river are also well employed.

The new works which were started by Messrs. Proctor & Son, manufacturers of tanks, ventilators, &c., at South Shore Road, Gateshead, early in the year, have since been kept very actively going, and are likely to continue so for many months to come, as recent additions to the contract account have been both numerous and important.

Messrs. J. H. Holmes & Co. have booked several good orders for electrical installations lately, and owing to the marked favour with which the "Lundell" motors have been received since their introduction by the firm, the demand for this speciality is likely to be largely increased, a circumstance which must necessarily cause a heavier pressure of work in the establishment. A few years ago the firm had to double the size of their works, and it would almost seem as if the time must soon arrive when a further extension will be necessary.

The special engine packings manufactured by Messrs. George Angus & Co., of the St. John's Leather Works, Newcastle, are, owing to the palpable advantages resulting from their use, steadily increasing in popularity. In this and other departments the firm are exceedingly busy both on home and foreign orders. On the occasion of a recent visit to their warehouses, we noticed several large parcels of goods, consigned to Japan, China, and various American ports.

THE WEAR.

Shipbuilding.—At the Manor's Quay repairing works of Messrs. J. L. Thompson & Sons, a fire occurred early in the month which, though of short duration, totally destroyed the joiners' shop with its contents, and a considerable quantity of timber, &c., in the immediate vicinity. The damage on the works alone is estimated to have reached £20,000, but there was in addition, a good deal of injury done to dwelling-houses in the neighbourhood. Messrs. Thompson, with characteristic generosity, have made good the losses incurred by the working people who inhabited the damaged houses, and have also contrived to keep the whole of the men employed, who, according to the too hasty calculations of local newspapers, were to have been laid idle as a result of the catastrophe. Only a couple of weeks have elapsed since the event took place to which we have made reference, and already a temporary erection of considerable dimensions has been run up, and is now being fitted with the requisite accessories for carrying on the joinery work, until a new building of much larger size and to be equipped in even a more elaborate manner than the former joiners' shop, is erected and ready for occupation. The firm do not enjoy an immunity from the misfortunes which are part of the common lot; but they have a rare faculty of recuperation, and seem to make light of difficulties which would permanently weaken the energies of others. The firm have at present an abundance of work on hand, but there is no reason to doubt that, long before the end of the year, they will have made up for the hindrance to progress caused by the fire.

Messrs. Blumer & Co. have received an order from a French firm for a good-sized steamer to be employed in the wine trade, and it is understood that the Strand Shipbuilding Co., who have at present but one vessel on the stocks, have also booked an order. Messrs. Austin & Sons have three vessels on the stocks, and are also pretty busy in the repairing department.

At the yards of Sir James Laing business is still active, and large deliveries of material are being made. Messrs. Doxford continue extremely busy and will soon put their second torpedo-destroyer into the water. At Messrs. Short Brothers' yard a continuance of briskness has also to be reported, and Messrs. Priestman & Co. are to be placed in a similar category. The yards of Messrs. Pickersgill and Messrs. Osborne & Graham are, however, short of work, whilst at the yards of Messrs. Robert Thompson & Sons business is satisfactory.

The locally-owned steamer *Ilios*, which met with an accident recently on leaving the harbour, is to be docked for repairs, which will probably be carried out by the Strand Shipbuilding Co., Limited. There seems to be a slightly better demand for the locally-made ships' wood boats, with which the recently patented steel boats have come into active competition. The principal firm of wood boat builders—Messrs. Robson & Sons—are now busier than for some time past. Messrs. Robson are, it should be stated, largely engaged in the timber trade as saw-mill owners and merchants.

Engineering.—The North-Eastern Marine Engineering Co. are likely to have their Sunderland works very busy for some time to come, as contracts have been received for a large number of small marine engines, besides one or two orders for engines of the heavier class. They have also in hand some

powerful pumping machinery, and other contracts for work of a special class.

Messrs. Maccoll & Pollock, of the Wreath Quay Engine Works, fitted the engines of the s.s. *Wreathier*, a fine lined steamer built by Messrs. Craig, Taylor & Co., of Thornaby-on-Tees, for the Goole and West Riding Steam Shipping Co., Limited, and the trial, which took place in the early part of the present month, proved to be of exceptional interest. The vessel attained and kept up throughout the trip a speed much beyond that guaranteed, and this was done under unfavourable conditions of wind and sea, and without the slightest indication of vibration. Though the manufacturers are comparatively a young firm, they have achieved, in this instance, a success of which the oldest firm might be proud, as both the builders and the owners of the vessel are most emphatic in their praise of the machinery and its capabilities in actual work. As showing the machinery efficiency, over 800 I.H.P. was indicated over a mean of several hours, this being equal to 12·7 I.H.P. per square foot of grate surface, and one I.H.P. for each 2·23 square feet of heating surface. Since the trial, the owners have written, expressing their satisfaction wiih the machinery, and stating that it has met with the favourable criticism of the Goole engineers.

Foundries continue to be kept fairly busy, and in the forges there is not as yet any marked slackness to complain of. Brass and copper works are generally busy, and the local iron works are kept steadily going.

Messrs. Robt. Bowran & Co., of 3, St. Nicholas' Buildings, Newcastle, have received an order for a "Stockport" gas engine of large power, to be put down at the Palmer's Hill Works, where one or two engines of this special type have already been in use for a considerable period. Messrs. Bowran, it should be explained, are the Northern agents for the "Stockport" engine, which is manufactured at the town from which it takes its name, by Messrs. Andrews & Co., and which has achieved a world-wide fame among manufacturers.

The Hartlepools.—The yards at this centre are still very well supplied with both new and old work, and in the case of Messrs. Irvine & Co. it is reported that a new order of importance has been secured. At the Hartlepool Engine Works (Messrs. Richardson & Sons) business is very active, not only in the engineering departments, but also in the forge and boiler shops, and in the supplementary shops where evaporators and other accessories are manufactured. The Central Marine Works are also very briskly employed.

Stockton.—The establishment of Messrs. Ropner & Son gives the best indication of prosperous business in occupied building berths, and initiatory departments fully engaged. At the other shipbuilding yards business is also satisfactory. Engineering works continue to show activity, and rolling mills are kept in steady operation.

Middlesbro'.—Messrs. Raylton Dixon & Co. are said to be putting down a steamer of the very largest class, and Messrs. Craggs & Sons are busily engaged with repair work as well as with vessels on the stocks. Steel works are generally busy, and both bridge works and foundries are well employed.

Consett.—In the plate rolling mills, as also in the angle mills of the Consett Iron Co., orders continue plentiful, and a large weekly output is maintained.

THE MERSEY.

(From our own Correspondent.)

A MORE satisfactory tone prevails generally in the iron, engineering, and shipbuilding trades of this district. In the iron trade the position is becoming steadily stronger, and it is expected that before long a considerable weight of buying will have to come upon the market. With regard to the engineering trades, activity is generally well maintained. Machine tool makers are full of work, both for marine and general requirements. Locomotive builders are also well engaged, and stationary engine builders and boiler-makers have plenty of work in hand. Some branches of the textile machine-making industry still continue rather slack, but this is the only department of trade in which there are any complaints of inactivity.

The most important event during the month has been the settlement of the dispute in the Oldham machine-making trades, which has affected about 12,000 men. Early in the month an agreement was come to with one of the firms affected—Messrs. Asa Lees & Co.—and work was resumed at their establishment. The workmen's joint committee then approached Messrs. Platt Bros., the largest firm in the district, with a view of effecting a settlement with them on the same terms as those which had been agreed to by Messrs. Asa Lees. After considerable negotiation, Messrs. Platt laid before the men the terms on which they were willing to allow the men to resume work. Their proposal was that mechanics, fitters and turners engaged on piece-work, and not earning more than 41s. per week, should be advanced 5 per cent., and grinders 1s. per week, and neither these increases nor the advance previously granted to labourers should come out of the piecework dividends. The firm stated, however, that owing to departmental changes made during the strike they would not be able to reinstate all the men in their old positions. The workmen accepted the proposals respecting piecework wages, but declined to return to work until the firm guaranteed that every man should be reinstated in his old position without prejudice. To this condition the firm finally agreed, and on their decision being made known operations were immediately resumed at Messrs. Platts' works. The dispute with the above firm had lasted nine weeks, and affected about 9,000 men.

The usual monthly returns of the principal engineering trade unions show a reduction in the number of unemployed members on the books. The Amalgamated Society of Engineers report only 3 per cent. on donation, and with the settlement of the Oldham dispute this number has been considerably reduced. In the Manchester district there are less than 2 per cent. on benefit. The Machine Workers' Association reports only 1 per cent. in this district, and 3 per cent. throughout the society, on donation. The Steam Engine Makers' Society has not more than 1 per cent. of its membership receiving support. The condition of trade is reported as very satisfactory, and in marine centres activity is well sustained. During the month advances of wages have been obtained in numerous important centres, and the notice recently sent to the London employers respecting the eight-hours day has elicited very satisfactory responses from many of the employers. In the monthly report of the Amalgamated Society of Engineers reference is made to the machine labour question. The general secretary here—as in his reply to the employés' manifesto—acknowledges the conciliatory language in which the letter sent by the Federation was couched, but regrets that the employers failed to meet the men's proposals favourably. Mr. Arrandale's communication might, he says, have something to do with it, but however that might be, the Amalgamated Society of Engineers would make further efforts to get an adjustment made of the conflicting principles and interests involved, without actual hostility or ill-feeling. With regard to the new combination of the Manchester employers, the secretary remarks that the Federation was extending its borders by the inclusion of the Manchester Employers' Association, and now covered the chief engineering centres. The need then for broadening and strengthening the basis of unionism had now been made sufficiently manifest.

Messrs. Laird, Bros., of Birkenhead, report that good progress is being made with the *Glory*, and they expect that the fourth of the Irish mail boats will be launched next month. The strike of shipbuilders at their establishment, which arose out of a dispute with the drillers on the question of demarcation of work, has been settled, and the men have resumed operations.

Messrs. J. Boon & Co., Cromford Court, Manchester, are bringing out a new metallic packing, specially suitable for marine engines. This packing consists of an outer case, built up in sections, having three separate compartments, in which are held the metallic rings. In each of the compartments are two rings, each divided into three segments and held at an equal pressure to the rod by means of a composite metal spiral spring band, which is unaffected by heat, and is not liable to corrosion. Ample space is allowed for the rings to move freely with any oscillation that may be caused by the rod not being in line with the cylinder. The packings will last as long as any other working part of the engine, and require no attention after being put on. They cause no injury to the rod, and are quite steam-tight, under the most severe pressure. Altogether the "Boon" packing forms a very simple and efficient arrangement.

Some time back we gave an illustrated notice of a large multiple punching machine built by Messrs. De Bergue & Co., of Manchester, for punching pontoon plates. The same firm are now constructing another of these machines, which is to be used for punching the plates in the largest floating dock ever made, weighing some 12,000 tons, and for which Messrs. Stevenson, of Newcastle, have obtained the order. This punching machine will be of the same type as that supplied to

Messrs. Swan & Hunter. The firm are also very busy on orders for their pneumatic riveters, for which there is just now an exceptionally large demand.

The Beaumont Pump Works, Stockport, are now making their "Rapid" centrifugal pumps in the double form. In this arrangement two pumps are fixed to the one baseplate, and coupled together by means of a central pulley, driven by one belt. Each pump is, however, quite independent in action, the advantage of the double form being compactness and economy in driving power. They are also making an improved design in steam pumps, in which the pump and engine are on the same bed-plate, the belt being driven direct from the fly-wheel. This also is a very compact and economical arrangement.

Mr. James Hodgkinson, of Salford, has recently made several improvements in his steam-generating and mechanical stoking plant. In his steam-generator and superheater the arrangement of the pipes has been modified, so that they can be readily removed for cleaning and other purposes. This generator is specially adapted for marine requirements, and is a very economical arrangement. In Mr. Hodgkinson's patent mechanical coking stoker, the air-spaces have been enlarged, and the form of the top coking or distributing plate has been altered, with the result that greater durability is secured.

In connection with the new goods warehouse which is being built in Manchester by the Great Northern Railway Co., it is reported that Messrs. Heenan & Froud, of Manchester; Keay, of Birmingham; and Harrold, of Glasgow, have secured the contracts for the whole of the steel work—some 13,000 tons—that will be required.

During the past month the position of the iron trade has shown a decided improvement. Although there has been no marked increase in the weight of business doing, prices have assumed a stronger tone, and makers, notwithstanding underselling by merchants, hold firmly to their quoted rates. For local and district brands of pig-iron, quotations are without alteration. During the month the Lincolnshire furnace proprietors have held a couple of meetings to consider prices, but have come to the decision not to give way on their present list, whilst for one special brand an advance is being quoted. Delivered Manchester, Lancashire, forge is quoted 46s. 6d. and foundry 48s. 6d. less 2½; Lincolnshire forge 44s. and foundry 45s. 6d., with Derbyshire foundry 47s. to 48s. net delivered Manchester, but merchants would take considerably under the above figures. Outside brands have shown an upward move of from 6d. to 1s. per ton. For ordinary foundry Middlesbrough merchants would not take under 48s. 4d., whilst for special brands makers are quoting 49s. 4d, delivered by rail, Manchester. Eglinton and Glengarnock are firm at 46s. 6d. delivered Lancashire ports, and 48s. 9d. to 49s. net, prompt cash, delivered Manchester Docks, with American pig-iron averaging 46s. to 47s. net delivered Docks.

In the finished iron trade business comes forward but slowly, and prices for bars and sheets show no improvement upon the weak tone reported last month. For Lancashire bars makers quote £5 17s. 6d., but they are not in all cases firm at this figure, while merchants are offering at 1s. 6d. per ton less.; for North Staffordshire bars makers still ask £6 2s. 6d. to £6 5s., delivered here. Sheets continue weak, and £7 to £7 2s. 6d. represents about the average figures. Hoops are only in a limited demand, but there is no change in prices, which remain at £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, with 2s. 6d. less for shipment.

No material change is noticeable in the steel trade, except as regards hematites, which have eased down about 1s. per ton, ordinary foundry qualities being now obtainable at 57s. to 58s. less 2½. Local made billets remain at about £4 10s. net delivered here. In finished steel, some fair orders have been given out, and for bars £6 3s. 6d. to £6 5s. has been got, whilst makers of boiler plates are declining to take anything under £6 5s. per ton, delivered in this district.

In the metal market the recent fall in copper led to a reduction of ¼d. per lb. in "list" rates for brazed brass tubes, rolled brass and brass and copper wire. Makers, however, are very busy, and with the upward move that has since taken place in copper there has, with the close of month, been a return to the old list rates for manufactured goods. List rates delivered Manchester district are as under:—Solid drawn brass tube, 7¼d.; condenser tubes, 8¾d.; copper tubes, 8¾d.; brazed copper tubes, 8¼d.; brazed brass tubes, 8¼d.; brass wire, 6¼d.; copper wire, 7¼d.; rolled brass, 6d. per lb.

There is no special new feature to notice in the timber trade. Imports have been moderate, and with deliveries fairly satisfy; stocks are reduced to a reasonable limit; prices are practically unchanged. For East India teak there is a fairly steady demand, with stocks not excessive, and prices unaltered. There has been a good demand for greenheart, but stocks are ample, and values without change.

A steady business comes forward in the coal trade, and pits are kept going about five days a week. House coals have been in good demand, considering the time of the year, and prices generally are maintained at late rates, although here and there some slight easing down upon these is noticeable. Steam and forge coals move off fairly well, but with supplies ample, prices are kept low. At the pitmouth best Wigan Arley average 10s. to 10s. 6d.; Pemberton four-foot and seconds Arley, 8s. to 8s. 6d.; common house coals, 6s. 6d. to 7s.; steam and forge coal, 5s. 9d. to 6s. 3d. With regard to the locomotive fuel contracts, one of the large companies has succeeded in obtaining its supplies at 5s. 9d. per ton at the pit, and neither of these nor upon gas coal contracts is it likely that colliery owners will be able to secure any material advance on last year's prices. Engine fuel moves off readily, and although the output is above the average for the time of the year, supplies are not excessive and prices show a hardening tendency, slight advances being got in many cases on forward contracts. At the pitmouth common slack averages 3s. 3d. to 3s. 6d; medium sorts, 3s. 9d. to 4s. 3d., and best qualities, 4s. 6d. to 5s. per ton.

In the shipping trade a fair business is reported to be stirring, but prices continue low, common steam coal, delivered at the Mersey ports, not averaging more than 7s. 3d. to 7s. 6d. per ton.

BELFAST TRADE NOTES.

(From our own Correspondent.)

THE same busy state of trade still continues in all the shipbuilding and engineering works in connection with this port, and everything seems to point to a prosperous year, as an instance of which we were informed the other day that one firm of coppersmiths had booked orders for all the winch pipes and deck fittings for twelve steamers from one firm alone. This means work, material, and money, as they are all large vessels.

Messrs. Harland & Wolff, Limited, have been extremely busy getting the Hamburg-American steamer *Augusta Victoria* finished. This vessel has been here for about six months, she having been put into graving dock and cut in two, which delicate operation was performed most successfully, increasing her length by 60 ft. 8 in., and also increasing her carrying capacity by 1,500 tons, besides giving a large amount of added deck space, which is used for increased saloon and cabin accommodation. We may just mention in passing that this is the twelfth vessel lengthened by the above eminent firm during the past 25 years, the one previous being the Union liner *Scot*, which had 50 ft. put into her. In the case of the *Augusta Victoria*, her machinery has been thoroughly overhauled and adjusted, her boiler-room re-arranged with additional boiler power, capable of indicating little short of 20,000 H.P. The length of this vessel is now 525 ft., beam 54 ft., depth 42 ft. She has two pole masts and three funnels, and we should say she is now one of the finest vessels in the passenger trade on the Atlantic. As a matter of fact she is most magnificently fitted out in every respect, the saloons and accommodation being very large, and fitted with every convenience and comfort for ocean travellers.

The Hamburg-American Co. can now boast of having the largest tonnage afloat in the world. The jubilee of this company is to be celebrated in Hamburg on the 27th inst., and some idea of the importance attached to the occasion may be gleaned from the fact that it is understood his Imperial Majesty the Emperor, accompanied by the principal State officials, will be in attendance. A State banquet will be given on board the *Augusta Victoria*, and anyone who has had the privilege of examining her saloon accommodation will easily believe she is specially adapted for such a function, as the main saloon, music-room, social hall, &c., are each in their particular way perfect examples of comfort and elegance. She left the port last week under the command of Captain Carl Kaempff, and after adjusting compasses and having a run down the Lough to see if all was in good order, proceeded to Hamburg, from

which port she will shortly be again on the Western Ocean as one of its greyhounds, and we trust that after all the money, care, and thought which has been expended on her, she will prove herself worthy of it.

The latest addition to the magnificent fleet of the White Star Line is the s.s. *Delphic*, which was recently launched by Messrs. Harland & Wolff, and which left their dock on May 15th, to adjust compasses and try her machinery. After a most satisfactory trial to both owners and builders, the steamer left for Liverpool same evening. She will there load for New York, but we understand she will take her station on the London and New Zealand route, being specially fitted with nine holds for the carrying of dead mutton.

The s.s. *Langton Grange* left here after having her machinery, etc., thoroughly overhauled by her builders, Messrs. Workman, Clark & Co., after her recent severe experience and misfortune in the Atlantic, to resume her usual route from London to New Zealand.

Both Messrs. Harland & Wolff, Limited, and Workman, Clark & Co., Limited, have several large vessels nearly completed, and also a few ready for launching. Altogether the shipbuilding and engineering trade at this port is very flourishing, and we trust that nothing will crop up over the engineers' wages question to mar the harmony of good trade and good wages.

Messrs. Coombe, Barbour & Coombe had a destructive fire in one department of their works in the beginning of the month, which did a large amount of damage, mostly in the export and finishing departments. They have erected temporary workshops to employ their hands and renew their orders.

Altogether the trade here at present is remarkably good in all branches—shipbuilding, engineering, moulders, and small machine works being full of orders for some time to come.

NORTH-WEST OF ENGLAND.

(*From our own Correspondent.*)

Barrow.—With reference to new business in the shipbuilding and marine engineering trades of the North-West of England there is none to report. There are not many enquiries in the market for commercial tonnage, and many yards are much better cut out for the cheap class of tonnage in vogue in almost all shipping excepting that of the first-class than are those of Barrow, consequently the active competition experienced runs local builders to some extent out of the market. There can be no question about it that yards which have been accustomed to the best type of Admiralty work, and which have built some of the best class of ocean steamers in the passenger service, cannot build as economically as others can the lower grades of tonnage, because it is impossible to secure as much work from men who have been trained to do it well and thoroughly, and up to the highest standards, as can be done where the conditions of tests and inspection are severe. Therefore if there is not much doing in good commercial work or in Admiralty work, the yards accustomed to deal with this trade are more or less depressed. In the case of Barrow, fortunately the work in hand for the British Admiralty is fairly large, and is at present engaging much attention, so that in the interim, while new orders are scarce, a fair amount of activity is maintained. But new orders are required even now, and if a regularity of activity is to be secured they must be obtained before long. The change in the ownership of the Barrow yard, which has now been satisfactorily arranged on both sides, and which takes effect at the end of June, puts matters in a state somewhat of transition, but as the old staff of the Naval Construction and Armaments Co. is retained by Messrs. Vickers, Son & Co., with Mr. A. Adamson, the managing director, at its head; the negotiations pending for new business are being carried on, and will probably lead to new orders at an early date. Further than this, it is already evident that the new owners have been looking well ahead, and have been preparing to put down some new tonnage, chiefly in the form of war vessels of various types, which have been the subject of negotiations for some time. Barrow, in fact, is about to open its works to the building of ships for foreign navies, and for this special work Messrs. Vickers are undoubtedly well prepared by reason of the fact that they produce their own armour plates and their own guns, which they will be able to utilise on ships built at their Barrow yard. Vickers' armour plates are of course well known and highly appreciated by both Her Majesty's Government and by foreign Powers, which have had the opportunity of judging of the marvellous tests to which these plates have been put. But as gun makers, Messrs. Vickers have only recently commenced business. They, however, have secured several important patents, which have proved of great value and importance, and it is confidently believed by experts that these guns will win for themselves a position equal, if not superior to that of any gun yet known. These guns will be manufactured in Sheffield and tested at Eskweals, on the Cumberland coast, a place situated about thirty miles from Barrow. A visit was paid to Barrow in the middle of May by several gentlemen connected with the Japanese Legation, and they were taken through the Barrow Yard by Mr. John Vickers (chairman of his company), Mr. Albert Vickers, Mr. James Dunn, the new director, Mr. A. Adamson, and others. At a luncheon afterwards in the Board Room, Captain Yendo, Naval Attaché to the Japanese Legation, on behalf of the Commission, expressed how pleased they had been to see the capabilities of the works for turning out high-class warships of every description. It is probable this visit of the Japanese Commission to Barrow will mean new business to Barrow. At any rate, whether or not, it is no secret that the building of new warships for other Powers will soon be the accomplished fact at Barrow. There is not an equally good prospect at the moment of new work coming to hand from commercial sources. The appointment of Mr. James Dunn, late of the Admiralty, where he was Senior Constructor under Sir Wm. White, is a good one. He will act as Naval adviser to Messrs. Vickers, and will be able to influence a deal of new orders to the yard. The first of the two twin-screw steamers building at Barrow for the Great Western Railway Co., for the Channel Islands Service, is now on her trial trip. She is to steam 20 knots. Her sister-ship, the *Reindeer*, is being rapidly completed and will be ready for early trial. Another steamer of the same line, the *Ibex*, which sustained injuries in the English Channel some short time ago, is undergoing repairs at Barrow, and her engines are being overhauled. Amongst the other repair work on hand are three Clan Line steamers, which are being tripled. The work of completing the *Niobe*, first-class cruiser, is proceeding very well. Her engines have been fixed in their places, and her 36 Belleville boilers are nearly ready to be lifted in. The sister ship to the *Niobe*, the *Amphitrite*, is a scene of activity in the shipbuilding department. The four torpedo-boat destroyers, *Avon*, *Otter*, *Bittern*, and *Leopard*, are going through preliminary experimental trials. The new Fleetwood boat, the *Duke of Cornwall*, and the Manchester Corporation sludge-boat are well in frame. In the engineering department there is at present need of new orders, but these are likely soon to be secured.

West Cumberland.—A rather quieter tone is shown in the shipbuilding trade of West Cumberland, but it is only of a temporary character, and it is probable before long other new work will be commenced.

The Hematite Trade.—There is a stronger feeling in hematites, which are quoted at 50s. to 52s. for Bessemer mixed Nos., and 47s. 6½d. net cash, warrant sellers; 47s. 5½d. buyers. Stocks have now been reduced since the beginning of the year, 48,736 tons, and now stand at 247,210 tons; 37 furnaces are in blast as compared with 39 in the corresponding week of last year.

Shipbuilding Material.—There is a very good and steady demand for shipbuilding material, and the local mills are all busily employed, but orders are coming to hand more from outside than from local sources. This position, however, is likely soon to be changed.

Shipping.—The shipping returns from West Coast ports show steady increases. The exports of pig-iron this year, so far have reached 178,590 tons, and of steel 176,678 tons, as compared with 125,075 tons of pig-iron, and 189,778 tons of steel in the corresponding period of last year, showing an increase of 53,515 tons of pig-iron, and a decrease of 13,100 tons of steel.

Reviews.

The Naval Annual for 1897. By Hon. T. A. Brassey. Portsmouth: J. Griffin & Co. 1897.

As time goes on and the public becomes more and more educated to understand our dependence on the Navy, the general reader takes more and more interest in this annual publication. That intelligent interest is in some sort due to the work of Lord Brassey, the father of the present editor, and originator of the Annual. It is, therefore, with feelings of some surprise and much grief that we read in an essay on the Progress of the British Navy, by the editor, which constitutes the first part of the present issue, a remark to the effect that it would be "unwise of

those responsible for the defence of the Empire to take full advantage of the present state of public feeling." Public feeling has, it seems to us, recognised that the command of the sea is vital to us, and the country will, therefore, cheerfully sustain any burdens which those responsible for the defence of the country think it necessary to lay upon the taxpayer in order that our sure possession of that command of the sea may be maintained. The responsibility of our rulers is therefore very largely increased. They see—as we all see—that the spirit of unrest and of aggrandisement is abroad amongst the nations of Europe, and that at any moment the weak may find the enemy at their throats. They must therefore keep us strong, and strong in proportion to the strength which other nations are accumulating. The task set before our Cabinet is rendered easier by the feeling of the taxpayer, and though they certainly would not be justified in wasting our resources, they have no excuse, in the present temper of the nation, for not providing adequately for the maintenance of our safety under all circumstances. Mr. Brassey speaks of the tendency to be lavish and of the necessity for curbing it. We must say that as yet we have seen no such tendency. There was nothing in the recent Estimates to suggest it. Nay, from what has since happened in regard to the plans of others, we should not be surprised if the Government thought them somewhat insufficient. We are pained indeed to find the editor of Brassey's *Naval Annual* taking this line, and we hope that the words we have quoted may be capable of some other construction than that in which we understand them.

But the value of the statistics and of the history comprised in the volume is unaffected by the opinions expressed by the editor. His *resume* of the progress of the Navy during the year is comprehensive and valuable. He gives particulars of the ships laid down, launched, and tried, and the book is embellished with very fine representations of the second class cruiser *Eclipse* and of a Laird-built thirty-knot destroyer. A note of the more important overhauls of the older vessels is given, and observations are also made on the personnel of the Navy. Regret, in which we cordially share, is expressed as to the omission of the Admiralty to make provision for a large increase in the numbers of the Royal Naval Reserve.

As regards foreign Navies, we learn that the system by which so many of the finer French ships have exceeded their estimated displacement to the cost of their efficiency as sea boats, is now in a fair way to be abolished, a new bureau of construction having been instituted. Attention is called also to the development of the Russian Volunteer Fleet, an organisation which certainly has not in the past, had that attention in this country to which its importance entitles it. Ever since the *Naval Annual* was in the hands of the public the announcement has been made that the sailings which the Volunteer Fleet has made between the Black Sea and Eastern Asia are to be very largely increased in frequency.

In his reference to Germany, it is pointed out how rapidly the Estimates here have climbed up year by year since the present Emperor has been able to make his influence felt. And this quite apart from the large supplementary Estimates which are now agitating public opinion in the Fatherland. The United States, too, are going in strongly for the position of a first-class Naval Power. The policy of the War College here is strikingly characteristic. It is laid down by Secretary Herbert that all plans of battleships for the future must contemplate 23 ft. as the extreme limit of draught under the most pressing circumstances. Though water-tube boilers have not yet been adopted for their warships, the Americans are making experiments with a view to their adoption. It is satisfactory to see that the pernicious systems of premiums for speed are now abandoned by this Naval Department. The South American Navies still seem to keep themselves supplied with the best class of British built ship from the yards of Armstrong, Laird, and Yarrow. Japan is making herself a Navy which may make her a worthy foe of almost any Maritime Power in the world, and even China seems to be trying to resuscitate herself.

In his review of comparative strengths of the various Navies, the Editor has attempted a new classification of battleships. The idea is to split the classes still further, so as to show the relative strength of the various Navies more closely. By dividing the main classes into A and B, the obvious error of counting, say, the *Collingwood* as equal in value to the *Majestic* is avoided, though they are still both retained in the main first-class. Mr. Brassey sums up the position here with the remarks that we are "safe till the end of the century in first-class battleships," *but that we* "are singularly deficient in light draught battleships." "It would," he says, "be a great waste of power to use a *Majestic*, or even a *Canopus*, to neutralise such vessels as the *Bouvines*, the *Henri IV.*, or the *Sissoi Veliky*." Poor *Sissoi Veliky!* Since these words were written fate has almost made her neutralise herself by one of those unfortunate accidents from which no navy can be free, and by which we see so many brave men lost. But we feel inclined to ask here, "Can it be supposed that in time of war we can fit our coats so neatly to the cloth we have to cut?" Will it not be necessary to do what has to be done with the instrument that we find to our hand and not send home for a lighter ship because the one on the spot seems a trifle too good for the job? In the old days we found little British ships tackling big foreigners, and it would be sad indeed if we were to presume that the old spirit and the old skill had gone for ever. If it be that we have the big battalions so much the better. But we cannot expect to hit off a scratch contest to a few pounds of metal or a few tons of displacement. With a Navy whose duties are so manifold and so far-reaching as ours, it surely ought to be our aim to have as many ships as we can that can go anywhere and do anything. For this we must have size and coal endurance.

Continuing the idea evolved in the last issue of the *Annual*, we have a chapter on the German Navy, by Korvetten Kapitan Ferber. The choice of Germany is at the moment singularly happy. Captain Orde Browne is again responsible for the third part of the volume which deals with armour and ordnance, and here is a correction from last year. For the Elswick guns were, till this issue, compared with foreign quick-firers on an erroneous basis. For the latter were compared on their theoretical efficiency, the former on their actual performance on trial. This is now remedied. Captain Orde Browne also has a chapter on the Attack of Ships by Artillery Fire, and discusses the effect of such fire and the best means of tabulating ships defensive and offensive powers. The question of the defence of the Empire is dealt with in three chapters. Of these, two are by Mr. Brassey himself. They deal with the forces of Australia and with the Principles of Imperial Defence, whilst the other is by Sir George Clarke, who has recently proved that he has as great a weight of authority in naval warfare as he has long been recognised to have in the branch of the Service to which he more particularly belongs.

The usual accounts of the naval manœuvres at home and abroad are afforded.

To marine engineers the chapter by Mr. G. R. Dunell on their own subject will be perhaps most interesting. The writer discusses the comparative advantages of the Belleville and return-tube boilers, and does not altogether make for the new departure. But his strictures, so far as they go, may take some of the praise from the Belleville, but they do not seem to hit the principle of water-tube boilers, of which, after all, the Belleville is only one, if the best known, for big ships. Then we have a discussion of Mr. Mudd's new type of five-crank quadruple-expansion engine, which, in the *Tuckmona*, showed such very economical results. This most interesting chapter closes with a short reference to the performances of the *Turbinia*. Mr. John Leyland contributes a chapter on Naval literature, which has truly been a feature of recent years.

The first part of the volume closes with a discussion on the manning question, by Mr. Brassey. There is nothing of more burning importance. We are glad to see that he advocates a return to the old apprenticeship system, or something by which a similar result may be achieved. He also feels that the Colonies should be encouraged to train men for the Imperial Navy. It is certain that something must be done, and that quickly, or a British sailor will be a rare discovery on board a British vessel in the Mercantile Marine.

The usual tables of ships, guns, and armour are given, as well as the *resume* of Budgets and Estimates and Naval programmes. The illustrations are up to the usual standard and are somewhat more numerous than in previous issues. We may conclude our notice by saying that, though in one or two matters we have had to express our dissent from the propositions laid down by the editor, we feel that the book is as invaluable as ever. On so complex a question it would be strange indeed if all those who had devoted time and thought to the consideration of the matter were identically at one in all points. We recognize most cordially the work that the Brassey family has done, and is doing, both here and in Australia, for the consolidation and enlightenment of the Empire, and we feel sure that this volume—in spite of Mr. Brassey's expressions of regret that his father's assistance is unavailable—is a very worthy successor to those which have preceded it.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Middleham Castle.—Lately Messrs. Pickersgill & Sons, launched at Southwick, a steel screw cargo steamer of the partial awning deck type, which has been built to the order of Liverpool owners. The vessel is of the following dimensions:—Length, 325 ft.; breadth, 42 ft. 6 in.; depth, 21 ft. 9 in. The machinery and boilers are being supplied by Messrs. George Clark, Limited, of Southwick. The engines are of the triple-expansion type, having cylinders 21½ in., 36 in., and 60 in. diameter, by 42-in. stroke. The vessel was christened *Middleham Castle*. She has been built to Lloyd's highest class for vessels of this type.

Cormorant.—On April 14th Messrs. Cochrane & Cooper launched at Beverley, for Mr. T. Bascomb, of Grimsby, the iron-screw trawler *Cormorant*, of 158 tons gross. She is to class 100 A1.

Ireland.—On April 15th Messrs. Cook, Welton & Gemmell launched at Hull, for the Hull Steam Fishing and Ice Co., Limited, the iron steam trawler *Ireland*, of 152 tons gross. She is to class 100 A1.

Snipe and Grouse.—On April 15th, Messrs. Edwards Bros. launched at North Shields, for Messrs. Kelsall Brothers & Beeching, Limited, the two steam trawlers *Snipe* and *Grouse*, each about 150 tons gross. They are to class 100 A1.

City of York.—On April 21st Messrs. J. Blumer & Co. launched at Sunderland, to the order of Messrs. Robinson, Brothers, Whitby, to Lloyd's highest class on the deep frame principle, the large screw steamer *City of York*. Her dimensions are as follows:—Length, 340 ft. over all; breadth, 47 ft.; depth, 24 ft. 10 in., moulded deadweight, 4,900 tons. The engines are by Messrs. Blair & Co., Stockton, and are of the triple-expansion type.

Vivian Jolliffe.—On April 21st Messrs. Mordey, Carney & Co. launched at Newport, for Messrs. J. and T. Jolliffe, of Liverpool, the steel towing steamer *Vivian Jolliffe*, of about 160 tons gross. She is to class 100 A1.

Metis.—On April 28th there was launched from the west yard of Messrs. C. S. Swan & Hunter, Limited, Wallsend, a steel screw steamer, built to the order of John Lockie, Esq., of Newcastle-on-Tyne. The vessel has been designed to carry a deadweight cargo of 5,600 tons on a moderate draught, or to carry a very large measurement cargo. The dimensions are:—Length, B.P., 330 ft.; breadth, 45 ft. 3 in.; depth, moulded, 28 ft. 9 in. The steamer is built to the highest class at Lloyd's on the spar deck rule, under special survey, and has a long bridge, topgallant forecastle and an iron house aft, in which is placed the steering gear. On the top of the bridge, in steel houses, is placed the accommodation for the captain, officers, engineers, &c., whilst the crew are located in the forecastle. Water ballast will be carried in the cellular double bottom and after peak tank. Powerful steam winches are supplied with a full complement of derricks and discharging gear. The steam windlass is of the latest design. The machinery is of the latest type of triple-expansion engines, built by the North-Eastern Marine Engineering Co., Limited, Wallsend. The cylinders are 24 in., 40 in., and 64 in. by 42 in. stroke, supplied with steam by two large single-ended boilers working at a pressure of 170 lbs. per square inch. On leaving the ways the steamer was named the *Metis* by Miss Lockie, aged two years and eight months, the daughter of the owner.

Ruby and Pearl.—On April 29th Messrs. John Jones & Son launched from their shipyard, Brunswick Dock, Liverpool, the two new paddle steamers *Ruby* and *Pearl*, which are being built by them to the order of the Eastham Ferry and Hotel Syndicate, under the superintendence of Messrs. Flannery & Tritton, of Liverpool and London. The vessels, which are double-ended, and are specially designed for service on the Mersey, are 134 ft. in length, 22 ft. beam, moulded, by 8 ft. 6 in. depth, and have two handsomely fitted saloons on deck, and a large promenade deck above with seating accommodation for a large number of passengers both in the saloons and on both decks. Owing to the special service on which the vessels will be engaged, the draught of water is limited to 4 ft. with a full load of passengers, which is considerably less than that of similar steamers running on the Mersey. The engines will be of the diagonal compound surface condenser type with feathering paddle-wheels, and supplied with steam from a large single-ended boiler working at 120 lbs. pressure. The vessels are fitted with steam windlass, Harrison's steam steering gear, a complete installation of electric light, and every latest improvement for passenger service, and are expected to be on their station early in June.

Sakkarah.—On Saturday, May 1st, Messrs. Wigham Richardson & Co. launched from their Neptune Shipyard, Newcastle-on-Tyne, a handsome steel screw cargo and passenger steamer, which they are building to the order of the Deutsche Dampfschifffahrt's Gesellschaft "Kosmos" of Hamburg. The steamer is 385 ft. in length by 46½ ft. beam, and will have well finished accommodation for a number of passengers and for emigrants. The engines and boilers are also being constructed by Messrs. Wigham Richardson & Co. The engines are quadruple-expansion, working at 210 lbs. pressure, and are balanced on the Yarrow Schlick & Tweedy system. The christening ceremony was gracefully performed by Mrs. Hennig.

Reindeer.—On Saturday, May 1st, the twin-screw steamer *Reindeer*, the second of two fast steamers, building at Barrow, for the Great Western Railway Co., was launched from the yard of the Naval Construction and Armaments Co. The moulded dimensions of the *Reindeer* are 280 ft. by 34 ft. 4 in. by 15 feet 6 in.; gross tonnage, 1,300. She has been built for the Great Western mail service, and will accommodate 600 passengers. There are three complete decks—lower, main, and promenade. She will be magnificently furnished, lighted throughout by electricity, and have special provision for ladies' sleeping and retiring accommodation. She will steam 20 knots.

Audrey.—On May 1st a paddle steamer was launched on the Tyne by Sir W. G. Armstrong, Whitworth & Co. for the Tyne General Ferry Co. The principal dimensions of the vessel are:—Length, 132 ft.; breadth, 21 ft.; depth, 8 ft. 3 in. The machinery will be capable of propelling the vessel at a speed of 12 knots. Passengers to the number of 600 can be carried on river service, and about 250 at sea. The vessel was christened *Audrey*.

Windsor.—On May 3rd Messrs. Ropner & Son launched, at Stockton-on-Tees, a steel screw steamer to the order of Messrs. Evan Thomas Radcliffe & Co., of Cardiff, of the following dimensions, viz.:—Length, 336 ft. 6 in.; breadth extreme, 46 ft. 6 in.; depth moulded, 27 ft. 3 in., and is built off the three-decked rule, and fitted with the builders' patent trunk, full poop, bridge, and topgallant forecastle. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of about 5,925 tons on Lloyd's summer freeboard on a light draught of water. She will have all the most recent appliances for the expeditious and economical loading and unloading of cargoes, has direct steam windlass, steam steering gear amidships, with powerful screw gear aft, six large steam winches worked by an auxiliary boiler working at 160 lbs. pressure, stockless anchors, &c. She will be fitted with triple-expansion engines by Messrs. Blair & Co., Limited, and was named *Windsor* by Mrs. Robert Ropner, jun.

Meridian.—On May 3rd Messrs. R. & W. Hawthorn, Leslie & Co., Limited, launched at Hebburn-on-Tyne to the order of the Eastern Carrying, Storing, Warrant and Insurance Co., of St. Petersburg, a steel twin-screw passenger and cargo steamer, 225 ft. by 32 ft. by 14 ft. 4 in. She is built to the requirements of Bureau Veritas, and designed and fitted throughout to meet the special Caspian Sea trade, for which the company intend her. The vessel was named *Meridian*, and is the fourth of those they are building.

Trougate.—On May 3rd Messrs. T. Turnbull & Son launched at Whitby a steel screw steamer, built to the order of Messrs. Turnbull, Scott & Co., shipowners, London. Her principal dimensions are:—Length between perpendiculars, 308 ft. 6 in.; breadth, 44 ft.; depth, 20 ft. 5¼ in.; estimated deadweight carrying capacity, about 4,000 tons. She is classed 100 A1 at Lloyd's, the engines being by Messrs. Blair & Co., of Stockton. The vessel was named *Trougate*.

Lighter.—On May 5th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, a steel patent self-discharging lighter of the following dimensions, viz.:—Length over all, 85 ft.; breadth, extreme, 22 ft.; depth of side amidships, 10 ft.; and with a carrying capacity of 1,350 quarters of grain,

for which purpose it was built. The vessel was built to the order of Joseph Rank, Esq., of Hull, and is the fourth lighter built for him.

Ville de Valenciennes.—On May 13th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Dock, South Shields, to the order of the Compagnie des Bateaux à Vapeur du Nord, Dunkerque, a steel-screw steamer of the following dimensions:—Length, 174 ft.; breadth, 36 ft.; depth, moulded, 24 ft. 8 in. The vessel is intended for the wine and general cargo trade. She is of the spar-deck type, classed Bureau Veritas special survey, and is fitted with double bottom for water ballast in the after-hold, and a deep hold tank in the main hold. The captain and passengers' berths are situated aft, with an entrance-house on spar deck, the accommodation for engineers and officers being placed under bridge amidships. Her engines, also constructed by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 23 in., 37½ in., and 61½ in., with 39 in. stroke, steam being supplied from two steel boilers working at a pressure of 160 lbs. per square inch. She was named the *Ville de Valenciennes*, and is the eleventh vessel built and engined for the above firm by Messrs. John Readhead & Sons.

George Fleming.—On May 14th Messrs. Short Brothers launched from their works at Sunderland a fine modelled vessel for the Nitrate Producers' Steamship Co., Limited, of London, of which Messrs. Lawther, Latta & Co. are the managers. The new vessel has been built of steel under special survey to the highest class in Lloyd's Register, and is of the following dimensions, viz.:—Length, 352 ft.; breadth, 45 ft.; depth moulded, 27 ft. 9 in.; the carrying capacity being 5,800 tons deadweight. Special attention has been given to the arrangement of upper and main decks, so as to enable a large number of cattle to be carried, suitable ventilation, &c, being provided. The erections on deck consist of full poop, long bridge house amidships, and topgallant forecastle, the saloon, captain's, officers', and engineers' accommodation being fitted in commodious houses on the bridge deck, with chart and wheelhouse on flying bridge. The steam steering gear is fitted in the engine-room with controlling rods from wheelhouse on flying bridge. The holds are four in number, powerful steam winches being fitted, steam for which is supplied by a large multitubular donkey boiler placed in the stokehold. The vessel will be supplied with triple-expansion engines by Messrs. George Clark, Limited, of Sunderland, having cylinders 24½ in., 40 in., and 66 in. diameter, with a stroke of 45 in., steam being supplied by two large steel boilers working at 180 lbs. pressure fitted with Howden's forced draught. She was named *George Fleming*, after the chairman of the company, who intended to be present at the launch, but unfortunately was prevented through indisposition, the ceremony being performed by Mrs. Short, of Ashbrooke Hall.

Doris.—On May 15th Messrs. Cochrane & Cooper launched at Beverley, for Mr. G. T. Armitage, of Hull, the iron steam fishing vessel *Doris*, of 190 tons gross. She is intended to class 100 A1.

Sturton.—On Saturday, May 15th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Sturton* to the order of Messrs. H. Samman & Co., of Hull, for the Sturton Steamship Co., Limited. The vessel will take Lloyd's highest class, and her dimensions are:—Length, over all, 300 ft.; breadth, 42 ft.; and depth, 21 ft. 9 in. The deck erections consist of a full poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., are fitted up aft, the engineers' rooms are in the bridge, and the crew's accommodation forward. The hull is built on the web frame system, with a cellular double bottom, large aft peak tank, large hatchways, four steam winches, steam steering gear amidships, hand-screw gear aft, large patent donkey boiler, patent direct steam windlass, boats on beams overhead, grain divisions, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel, including electric lighting. The Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, supply fine triple-expansion engines of 1,000 H.P., having cylinders 21½ in., 35 in., and 58 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The vessel and machinery have been built under the superintendence of Mr. Walter Sage, of Hull, and the ceremony of christening the steamer *Sturton* was gracefully performed by Mrs. Bailey, Kingston Lodge, Hessle; and there were also present at the launch Miss Walker, Miss Hazlewood, Miss Dickenson, Miss Hudson, Miss Glossop, the Misses Samman, Mr. Bulay, The Park, Hull; Mr. Bailey, Mr. Bladon, and Mr. Samman, all of Hull.

Hemisphere.—On Saturday, May 15th, Messrs. Bartram & Sons launched from their shipbuilding yard, South Dock, Sunderland, a large and handsomely modelled steel screw steamer, which they have built to the order of Messrs. W. Thomas & Co., of Liverpool. The vessel is of the following dimensions:—350 ft. by 46 ft. 6 in., by 26 ft. 9 in. moulded depth. She is one of the spar-deck type, with extra long bridge, poop and forecastle. She has been built under special survey to class 100 A1 at Lloyd's. There are seven steel bulkheads, and the ballast tanks will contain nearly 1,000 tons of water ballast. The frames are made very heavy, and the usual hold beams are dispensed with, leaving the holds very free from obstructions. The deck machinery consists of five steam winches, an extra large donkey boiler, steam steering gear in the engine-room controlled from the wheelhouse or flying bridge, steam windlass on the forecastle deck, and steam warping capstan on poop. The hatchways are very large, and have each double derricks. The whole of the accommodation for the captain and officers is placed on the top of the bridge-deck. The saloon, which is handsomely finished in polished oak, is placed at the fore-end of the bridge, and the berths for officers and engineers at the after-end. The crew have large and comfortable berths in the topgallant forecastle. The engines will be supplied by Messrs. John Dickinson & Sons, Limited, the cylinders being 24 in., 39½ in., and 65 in by 42 in stroke, supplied by two large boilers working at 180 lbs. pressure. As the vessel left the stocks she was gracefully named the *Hemisphere* by Miss Thomas, daughter of the managing owner.

Atlas.—On Monday, May 17th, Messrs. William Gray & Co., Limited, launched the fine, large steel screw steamer *Atlas*, which they have built to the order of Messrs. Rickinson, Son & Co., of West Hartlepool. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, over all, 336 ft.; breadth, 47 ft.; depth, 24 ft., 10 in.; and the deck erections consist of poop, bridge over the machinery space, and topgallant forecastle. A handsome saloon and state-rooms, together with the captain's and officers' rooms, will be fitted under the poop. The hull is built with web frames, and cellular double bottom for water ballast. Six steam winches, steam steering gear amidships, and screw gear aft, patent direct steam windlass, patent donkey boiler, steel longitudinal grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Fine engines on the three-cylinder triple-expansion principle are being supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited; they will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine, extra large steel boilers, having a pressure of 160 lbs. per square inch, will give an ample supply of steam. The construction of the ship and machinery have been under the superintendence of Mr. Charles E. Smith, on behalf of the owners, who has introduced a few improvements in the machinery, including an extra injection for use in shallow water; and the ceremony of christening the *Atlas* was gracefully performed by Miss Florence Rickinson, of Meadowcroft, West Hartlepool.

Basuta.—On Monday afternoon, May 17th, there was launched from Messrs. Robert Thompson & Sons, Southwick yard, a steel, single-decked steamer, built for Messrs. Maclay & McIntyre, Glasgow. Length, B.P., 320 ft.; breadth, 45 ft.; depth moulded, 23 ft. 9 in., on the deep frame principle, class 100 A1 at Lloyd's; deadweight capacity about 4,600 tons, on a very light draught; fitted with poop aft, long bridge amidships, on top of which are deckhouses for the accommodation of captain, officers, and engineers, with chart and wheelhouse, leaving a clear cargo space in bridge and poop, topgallant forecastle for crew and petty officers: ample water ballast in cellular bottom and after peak, being divided into six compartments for trimming purposes; five large hatchways and steam winch to each hatch; extra large donkey boiler. Engines by Messrs. Blair & Co., Limited, having cylinders 22½ in., 36½ in., 60 in., by 39 in. stroke, with extra large boilers. Both ship and engines have been designed with all the most modern improvements for a first-class cargo and cattle steamer. As the vessel left the ways she was gracefully christened *Basuta* by Miss Dent, of Newcastle.

Ambassador.—On Tuesday, May 18th, Messrs. William Gray & Co. Limited, launched a fine steel screw steamer which they have built to the order of Messrs. Hall Bros., of Newcastle-on-Tyne. She will take Lloyd's highest class, and in some parts the scantlings are in excess of Lloyd's, particularly under the boilers. The dimensions are:—Length over all, 324 ft.; breadth, 44ft.; and depth, 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, etc., will be fitted in the poop, the engineers' rooms in the bridge, and the crew's accommodation forward. The hull is built on the web-frame principle, with a cellular double bottom, large hatchways, five powerful steam winches, steam steering gear amidships, hand screw gear aft, horizontal multitubular donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. William Gray & Co., Limited, supply triple-expansion engines having cylinders 23 in., 36 in., and 62 in diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The hull and machinery have been built under the superintendence of Captain Wm. Lowrie and Mr. R. Williams on behalf of the owners, and the ceremony of naming the ship *Ambassador* was gracefully performed by Mrs. Charles Hall, of Byrrell Castle, who received a beautiful bouquet of flowers from Sir William Gray. There were also present at the launch Mr. John Hall, Mr. Charles Hall, and Mr. Mein, partners of Hall Bros., also Mr. George Reid, Belgian Consul, Newcastle-on-Tyne, and Mr. Little, of South Shields.

Dauntless.—On Tuesday, May 18th, in the presence of a large company, Messrs. the Blyth Shipbuilding Co., Limited, launched from their shipbuilding and repairing works at Blyth, a large steel screw steamer for Messrs. Sutton, Brewis & Co., of Newcastle-on-Tyne. The vessel is designed to carry about 3,500 tons on a very light draught of water, and is of the following dimensions:—Length, 298 ft.; breadth, 43 ft.; depth, 21 ft. 2 in. The accommodation for captain and officers will be tastefully arranged in the poop, the engineers in the bridge amidships, and crew in forecastle. The vessel is classed at Lloyd's, and is built on the single deck principle, but hold beams, and pillars are dispensed with, thus allowing cargoes of very large bulk to be stowed with ease. To facilitate the loading and discharging of the cargo everything of the most up-to-date type in deck machinery will be fitted. The engines are of the triple-expansion class of large power, and will be fitted by Messrs. Blair & Co., Limited, of Stockton-on-Tees, and with all their latest improvements. As the vessel left the ways the ceremony of naming her the *Dauntless* was very gracefully performed by Miss Coning, of Whickham Park. The hull and engines have been built under the superintendence of Mr. M. Havelock, consulting engineer, Newcastle-on-Tyne.

Tank Steamer.—Lately Messrs. William Dobson & Co. launched at Low Walker-on-Tyne a steel twin-screw tank steamer, which they have built for carrying petroleum in bulk. The dimensions of the vessel are:—Length, 232 ft.; breadth, 32 ft.; and depth, 18 ft. The machinery consists of two sets of compound surface-condensing engines, having cylinders 20½ in. and 39 in. diameter, by 24 in. stroke. Steam is supplied by two steel boilers, arranged for burning oil fuel.

Takasago.—On May 18th Sir William Armstrong, Whitworth & Co. launched from their Walker shipyard a protected-deck cruiser for the Japanese Government of the *Yoshino* type. The vessel is named *Takasago*, and her dimensions are:—Length, 360 ft.; breadth, 46 ft. 6 in.; draft, 17 ft.; and the contract speed is to be 23 knots. Her displacement is 4,160 tons. Both the *O'Higgins* and the *Takasago* are built to the design of Mr. Philip Watts, the naval director of the firm.

Ovidia.—On May 18th the s.s. *Ovidia* was launched by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and is built to the order of Mr. O. W. Nordin, of Paris. Her principal dimensions are:—Length between perpendiculars, 325 ft.; beam, extreme, 48 ft.; depth, moulded, 24 ft. 2 in. She is built to Lloyd's highest class, and is designed to have a deadweight carrying capacity, on a light draught of water, of about 5,000 tons, and has been specially constructed for the timber trade. She is built on the single-deck principle, having only one continuous deck right fore and aft, with a poop aft, bridge amidships, and topgallant forecastle forward. Water ballast is carried in the cellular double bottom and in the after peak. She is fitted with five transverse watertight bulkheads, and iron longitudinal bulkheads. The accommodation for captain, saloon, spare berths, &c., is in a house on the forward end of the bridge. Above this is placed a teak charthouse, and over this is fitted a flying bridge. The accommodation for the engineers, &c., is fitted on the after end of the bridge. Above this accommodation berths are fitted for the officers. In the after end of the bridge is placed the steam steering gear, connected with controlling gear on the forward end of the bridge; also house for electric light engine and dynamo, storerooms, &c. A powerful screw steering gear is fitted in the poop. The crew, firemen, and petty officers are berthed in the topgallant forecastle. The deck machinery consists of seven large steam winches, and the cargo is worked by double derricks at each hatch. A patent steam windlass is fitted on the forecastle head for the working of the stockless anchors. The vessel is rigged as a two-masted fore-and-aft schooner, the masts having special gaffs fitted, arranged for working the cargo, in addition to the usual derricks. The vessel is specially strengthened at the fore-and-aft ends for the resisting of ice, &c. Four boats are fitted on the bridge amidships. An electric light installation is fitted by the Sunderland Forge and Engineering Co., Limited. The saloon accommodation is fitted up in a high-class manner, and great care has been bestowed on the whole of the accommodation and sanitary arrangements. Special attention has been paid to the facilities for the rapid handling of cargoes. The vessel has been built under the superintendence of Mr. Jean Drakenberg, of Stockholm, and Mr. James Thompson, of Sunderland. The vessel will be fitted with engines of the triple-expansion type, built by Messrs. John Dickinson & Sons, Limited, Sunderland, the sizes of the cylinders being 24 in., 38 in., 64 in., by 38 in. stroke, supplied with steam by two large multitubular boilers working at 160 lbs. pressure. The vesse was gracefully christened by Miss Frida Nordin, of Paris, sister of the owner, and was launched by hydraulic power by Miss Ossbahr, of Hernosand, Sweden. There were also present at the launch: Mr. O. W. Nordin, owner; Captain Victor Nordin, who will take command; Mr. Jean Drakenberg, Mr. J. H. Charlton, and Mr. James Thompson (of the firm of Charlton & Thompson), Mr. E. Charlton (Paris), Mr. E. Charlton (Hartlepool), Mrs. J. H. Charlton, Miss Charlton, Miss Eyres, Mrs. James Thompson, Mrs. Robert Thompson, Miss Ferguson (Newcastle), Miss Andrew, Miss Hutchinson (Saltburn), Miss Darling, Mr. James Dickinson, and the members of the builders' firm. After the launch, which was most successful, the company adjourned to the firm's luncheon room, where the usual toasts were duly honoured.

Kronos.—On Thursday, May 20th, there was launched from the yard of the Sunderland Shipbuilding Co., Limited, to the order of the Neptun Steamship Co., of Bremen, a steel-screw steamer 190 ft. B.P. by 30 ft. breadth, and 21 ft. 9 in. depth, classed 100 A1 at Lloyd's under special survey, awning deck type, having deckhouse amidships. The officers' and engineers' messroom and accommodation is placed amidships alongside engine casing, whilst the captain and passengers are berthed in the house on deck. The vessel is provided with steam winches by Mr. R. Welford, of Pallion, and steering gears by Messrs. Donkin & Co.; tri-compound engines by Sir Christopher Furness, Westgarth & Co., Limited, of Middlesbrough, having cylinders 15½ in., 25 in., and 41 in., by 27 in. stroke, 160 lbs. working pressure. The steamer is built to carry about 1,200 tons deadweight on 15 ft. 3 in. draught, and is intended for the Rhine trade, and her speed loaded will be 10 knots average. During construction both hull and machinery have been inspected by Mr. Siemens on behalf of the owners, and upon leaving the ways she was gracefully named *Kronos* by Miss Madge Havelock, daughter of Mr. John Havelock, J.P., of Newcastle-on-Tyne, one of the directors of the shipbuilding company.

LAUNCHES—Scotch.

Gaviao.—Messrs. Ramage & Ferguson, Limited, launched from their yard a composite screw steamer, built to the order of Messrs. Blandy Bros. & Co., of Madeira, for their passenger and cargo trade round the islands. The vessel's dimensions are:—Length, 95 ft.; breadth, 21 ft.; by 9 ft. 6 in. moulded; the bottom planking being of elm and topsides of teak, the whole being copper fastened and sheathed. The engines are compound surface condensing, with 13½ in. and 26 in. diameter cylinders, by 20 in. stroke, supplied with

steam at 110 lbs. pressure. On leaving the ways the vessel was named *Gaviao* by Miss Graham, of Madeira.

Duchess and Pieter Faure.—On April 22nd Messrs. Mackie & Thomson, Govan, launched the two steamers *Duchess* and *Pieter Faure*. The former, which has been built for Mr. J. H. Williams, of Wellington, N.Z., is 143 ft. long, 26 ft. broad, and 11 ft. 3 in. deep. She is intended for passenger traffic between Wellington and neighbouring seaside resorts, and will carry about 1,000 persons. Triple-expansion engines by Messrs. Muir & Houston, with cylinders 15 in., 26 in., and 40 in. diameter respectively, and a stroke of 27 in. will be provided. The vessel will have two funnels, and will be elegantly fitted out. She was named by Mrs. W. A. Mackie, Falkland Bank, Partickhill. The *Pieter Faure*, which is named after the Minister of Agriculture at the Cape, has been built to the order of the Government of the Cape of Good Hope, through Sir David Tennant, agent-general in London. Dimensions:—Length, 120 ft.; breadth, 21 ft; and depth, 12 ft. Triple-expansion engines, having cylinders of 12 in., 19 in., and 31 in., will be provided by Messrs. Muir & Houston. The vessel is to be used for experimental fishing and for deep sea observations, and has been specially fitted for these purposes with wells for carrying fish alive, a full set of beam and other trawl gear, deep-sea fishing lines and other appliances. The *Pieter Faure* was named by Miss Thomson, of Blawart Lea, Scotstounhill.

Sea Eagle.—On April 28th Messrs. Duthie, Sons & Co., Aberdeen, launched from their shipbuilding yard a steel-screw trawler, built to the order of Mr. T. R. Oswald, Milfordhaven. The vessel is 117 ft. in length, 20 ft. 6 in. in breadth, and 12 ft. 3 in. depth. She is built to class considerably above Lloyd's highest specifications. The trawler, which was named the *Sea Eagle*, is intended for the trawling industry in the Bay of Biscay, the Irish coast, and the south of England.

Kylemore.—On Wednesday, April 28th, Messrs. Russell & Co., Port-Glasgow, launched the *Kylemore*, a handsome saloon river passenger paddle-steamer, which has been built to the order of Captain John Williamson, Rothesay. She is a sister vessel to the *Strathmore*, which was launched in March last by the same builders. Both vessels are alike in size and equipment, being 200 ft. long by 24 ft. beam, and depth 8 ft., having promenade deck extending nearly the entire length of the vessel, with saloon on main deck finished in hardwood, and fore and aft dining saloons under main deck. They are also fitted throughout with electric light. The engines, by Messrs. Rankin & Blackmore, Greenock, are compound double diagonal, the boilers being of the navy type, with mild forced draught.

Forshaw.—On April 30th a powerful sand-pump hopper dredger, built to the order of the Corporation of Preston, was launched from the yard of Messrs. Lobnitz & Co., Limited, Renfrew. This dredger is fitted with the most modern improvements for loading her hopper rapidly with sand by means of powerful pumping plant, which is driven by triple-expansion engines. Arrangements are so made that, instead of loading her own hopper, the spoil can be discharged direct ashore or into barges alongside. The dredger has been built under the instructions of Mr. A. F. Fowler, C.E., harbour engineer for Preston. The vessel, which was named the *Forshaw* by Mrs. Forshaw, successfully took the water in presence of Mr. Alderman Forshaw, chairman of the Ribble committee; Mr Alderman Bibby, vice-chairman, and the other members of the Ribble committee.

Steam Liner.—On May 1st a steam liner was launched by Messrs. A. Hall & Co., Aberdeen, for Messrs. Lundy & Brown, trawl owners, Grimsby. The vessel is 96 ft. in length, 20 ft. in breadth, and 10½ ft. in depth. She will be fitted with compound surface-condensing engines of 45 H.P. nominal, working at 130 lbs. The vessel will be registered at Grimsby, but will fish from Aberdeen.

Zara.—On May 1st Messrs. William Hamilton & Co. launched from the Glen Yard, Port-Glasgow, a steel screw steamer of 1,600 tons gross register for Messrs. Bailey & Leetham, Limited, of Hull. Her dimensions are:—Length, 257 ft.; breadth, 35 ft.; and depth, 19 ft. The steamer, which is built to Lloyd's highest class, is intended for passenger and cargo service between London and St. Petersburg. The plating is doubled and internally strengthened forward to prevent damage from contact with ice in the Baltic. A long poop deck extends for nearly three-fourths of the length of the vessel, and under this amidships accommodation has been fitted for 30 first-class passengers in large and airy state rooms. The dining saloon, smoking room, and pantry are situated in a deck-house on the poop deck. The saloon and smoking-room are fitted in the most luxurious manner, the walls being panelled in polished oak with tastefully carved pilasters, the sofa seats and chairs being richly upholstered in velvet. The accommodation for the captain and officers are spacious, and fitted up with every care for their comfort. All the newest requirements for the quick loading and discharging and the working of the ship has been supplied, including steam windlass, steam steering gear, five steam winches and derricks. The holds are fitted throughout with shifting boards for carrying grain in bulk. The vessel is schooner-rigged, and the topmasts are made to telescope so that the vessel can pass under the bridges on the Manchester Canal. The machinery, which is being supplied by Messrs. Hutson & Son, Kelvinhaugh Engine Works, Glasgow, is on the triple-expansion system, the cylinders being 22 in., 36 in., and 60 in. diameter by 39 in. stroke, steam being supplied by two large boilers working at 180 lbs. pressure. As the vessel left the ways she was named *Zara* by Mrs. M'Callum, of Glasgow. Immediately after the launch the vessel was towed to Glasgow to have her machinery fitted on board.

White Queen.—On May 1st a steel steam pleasure yacht, built to the order of Mr. J. Gordon Stewart, Essex, was launched from the shipbuilding yard of Messrs. J. Duthie, Sons & Co., Aberdeen. The vessel is 102 ft. in length all over, 18 ft. in breadth, 18 ft. 3 in. depth of hold, and 130 tons gross register. She was named the *White Queen* by Mrs. W. Rae, and will be the first vessel of the kind lighted throughout by acetylene gas.

Latchford.—On May 3rd there was launched from the yard of Messrs. S. M'Knight & Co. (Limited), Ayr, a steel screw-steamer of 530 tons for the Latchford Shipping Co., Manchester, of which Mr. J. K. Morris, Liverpool, is managing owner. The vessel has been designed for their Manchester, Liverpool, and south of England trade, and is complete with every requisite for south coast trade. She has cellular double bottom in forehold, large hatches with web frames to ship's side, and strong bracket to hatch coaming, two Kennaugh's steam winches and double booms for quick loading and discharging of cargo. The accommodation for captain and officers is neatly fitted up, and the saloon fitted up in polished teak with American oak panelling, and sofas covered with railway carriage repp. The accommodation for engineers aft is complete with every requisite for comfort. She will be propelled by engines of 17 in. and 40 in., by 27 in. stroke; boiler 12 ft. 9 in. by 10 ft., constructed by Messrs. Shanks, Morrice & Co., Pollokshaws. The vessel and engines were designed and superintended by Mr. Kennaugh, superintendent engineer, Whitehaven. The vessel, as she left the ways, was christened the *Latchford* by Mrs. Roberts, Manchester.

Miles K. Burton.—On May 4th Messrs. Wm. Simons & Co., Limited, launched complete from their works at Renfrew a twin-screw hopper grab dredger, which they have constructed for the Mersey Docks and Harbour Board, under the direction of their engineer, Mr. A. G. Lyster, and which will be chiefly employed in dredging silt and deposit in the Liverpool Docks. This vessel is called the *Miles K. Burton*, and is of the following dimensions:—Length, 230 ft.; breadth, 38 ft.; depth, 17 ft. The hopper has a capacity for 30,000 cubic feet of dredgings, twin-screw triple-expansion engines of 1,500 I.H.P., and boilers of 160 lbs. working pressure. The dredging machinery consists of five hydraulic cranes, fitted with grab buckets, each capable of containing about 5 tons of material. The cranes dredge to a depth of 47 ft. below the light water line and delivers the spoil into the vessel's own hopper. Independent steam lifting gear for the hopper doors and special steam winches are provided fore and aft. Electric light is also fitted throughout the vessel for working day and night, steam steering gear, &c., &c. The vessel with its machinery has been constructed to the highest class at Lloyd's, and is the ninth dredging vessel constructed by the builders for the Mersey Docks and Harbour Board.

European, Ebor, and Elbe.—On May 5th Messrs. Mackie & Thomson launched the *European*, the *Ebor*, and the *Elbe*, three steam fleeters, which they have built for the Great Northern Steamship Co., Hull. The dimensions of each are:—Length, 103 ft. 9 in.; breadth, 21 ft.; depth, 11 ft. 7 in.; and tonnage, 160 gross. Triple-expansion engines, with cylinders of 11 in., 17 in., and 28 in. in diameter by 21 in. stroke, will be fitted by

Messrs. Muir & Houston, Kinning Park. The owners were represented by Mr. H. F. Fourny, of Hull, their consulting engineer.

Wellington.—On May 5th there was launched from the shipyard of Messrs. Cumming & Ellis, shipbuilders, Inverkeithing, a steel screw tug to the order of Messrs. John Cran & Co., Leith, for Messrs. the Alexandra Towing Co., of Liverpool, of the following dimensions, viz.:—Length, 92 ft.; breadth, 20 ft.; depth 12 ft., into which will be fitted powerful engines by Messrs. John Cran & Co., of Leith. The vessel has been built in excess of Lloyd's requirements, and will be classed 100 A1 for towing purposes, and under the supervision of Mr. Hughes, of Liverpool. As the vessel left the ways she was gracefully named the *Wellington* by Miss Marie Ellis, Inverkeithing.

Dobrogea.—On May 6th Messrs. R. Napier & Sons, Limited, launched from their shipbuilding yard, Govan, the first of three steel screw steamers of about 2,200 tons they have on hand for the Direction Generale of the Roumanian State Railways, Bucharest. The general dimensions are:—Length, 300 ft.; breadth, 39 ft. 6 in.; depth, 24 ft. 6 in., with a topgallant forecastle, long bridge, and full poop, and is built of steel on the deep-frame principle, with cellular double-bottom all fore and aft, to the highest class at Bureau Veritas under special survey. These fine vessels have been specially designed to meet the requirements of the service of the Government State Railways, and are intended to develop the port of Constantya, which is in the province of Dubrogia, and will be open all the year round. Extensive harbours are at present being made there, and the new vessels will no doubt carry outwards the coal that is required for the railways and the steamers engaged in running with the Orient and Ostend express service of mails and passengers to Constantinople, and in transporting the large quantities of cereals grown in Roumania to the markets of Europe. The most modern appliances have been supplied for the efficient working of the ship and the rapid handling of cargo, including a complete installation of electric lighting throughout the vessel, and comfortable accommodation for the captain, officers, and engineers has been provided on the bridge deck. The machinery, which has been constructed at the builders' Lancefield Engine Works, consists of a set of triple-expansion engines, with two steel boilers, and fitted with the most recent improvements for efficiency and economy. As the steamer commenced to move down the ways she was named the *Dobrogea* by Miss Erie Turner.

The Queen.—On Saturday afternoon, May 8th, the Ailsa Shipbuilding Co. launched a steel screw steamer for Messrs. J. Hay & Sons, coasting and Continental trade. She is of the following dimensions:—Length, between perpendiculars, 175 ft.; breadth, 26 ft. 10 in.; depth moulded, 13 ft.; and will be fitted with compound engines, 21 in. and 44 in. cylinders, with 30 in. stroke, by Messrs. Muir & Houston, Limited. She was christened *The Queen* by Miss I. B. B. Cowan, Viewfield, Troon, the name being adopted by Messrs. Hay to commemorate the long reign of her Majesty Queen Victoria.

Elleric.—On May 10th Messrs. Russell & Co. launched from Kingston Yard, Port-Glasgow, the steel screw cargo-carrying steamer *Elleric*, of 5,800 tons deadweight, to the order of Messrs. Andrew Weir & Co., Glasgow. The dimensions are:—Length, 340 ft.; breadth, 46 ft.; depth, 28 ft. 6 in. Messrs. Rankin & Blackmore, Greenock will supply the machinery.

Nautik.—On May 12th Messrs. Carmichael, Maclean & Co. launched from their shipbuilding yard, Greenock, a steel screw steamer of 1,050 tons gross, with carrying capacity of 1,600 tons deadweight, classed 100 A1 at Lloyd's, and of the following dimensions:—Length, between perpendiculars, 225 ft.; breadth, 34 ft.; depth moulded, 16 ft.; to carry 1,600 tons deadweight. The vessel which is for the Dampskibsselskabet Vesterhavet, Denmark, is intended for their Baltic trade, &c., and will be fitted with triple-expansion engines, supplied by Messrs. Hutson & Son, Glasgow, having cylinders 17 in., 27½ in. and 44 in. by 33 in. stroke for a working pressure of 160 lb. The vessel is fitted with four steam winches, donkey boiler, steam windlass, steam steering-gear, and all modern appliances for working the cargo. The ceremony of naming the vessel the *Nautik* was gracefully performed by Mrs. Thos. Greig, of Methil. On completion, the vessel will be commanded by Captain Meineitz, under whose superintendence the vessel has been built.

Egypt.—On May 15th Messrs. Caird & Co. launched at Greenock the magnificent steel screw steamer *Egypt*, which they have built for the mail and passenger service of the Peninsular and Oriental Steam Navigation Co. She is a sister ship to the *India*, launched in April of last year, and her dimensions are:—Length, 500 ft.; breadth, 54 ft.; depth, 37½ ft.; and of 8,000 tons register. She will be furnished by the builders with triple-expansion engines of 11,000 effective H.P. Like the *India*, the *Egypt* will be one of the best-equipped and most efficient ocean-going steamers afloat. She is modelled on beautiful lines, and constructed of the finest material. Built in accordance with Lloyd's 100 A1 class, she will carry 500 saloon passengers, whose comfort and convenience have been considered in every way. As in vessels recently built for the P. and O. Co., the saloons have been designed by Mr. T. E. Collcutt, the eminent architect of the Imperial Institute, while the handsome wood panellings in the saloon, music room, smoking room, library, &c., have been executed by the employés of the Messrs. Caird. Rich plaster-work adorns the ceilings, and all the apartments will be beautifully upholstered. The state-rooms, some of which can be used as family rooms, will be luxuriously furnished, and supplied with every requisite for the comfort of those travelling to or from the East. The ventilation and sanitary accommodation are of a first-class description, and the ship is lighted throughout with a complete installation of electricity. The *Egypt* carries a full complement of boats and life-saving appliances, and accommodation of a superior kind is provided for both officers and crew. The engine-room is fitted up with the latest appliances. Howden's patent system of forced draught will be used on the boilers. The shafting throughout is of Vickers' steel, and the propeller blades are of manganese bronze. The cargo gearing is all hydraulic and practically noiseless in its working. The *Egypt* has been constructed under the superintendence of Mr. H. J. Taylor, and the engines under Mr. John Pettigrew.

Cheronea.—On May 15th there was launched from Messrs. Russell & Co.'s shipbuilding yard a steel spar-decked screw steamer named *Cheronea*, to the order of Messrs. William Thomson & Co., of St. John, New Brunswick, whose agents in this country are Messrs. G. T. Soley & Co., Limited, Liverpool, of the following dimensions:—325 ft. by 48 ft. by 25 ft., designed to carry 5,000 tons deadweight on a draught of about 20 ft. The vessel is fitted with all the latest and most modern improvements for the rapid handling of cargo, and is specially intended for the Atlantic deal trade. After the launch the vessel was towed to the Victoria Harbour, Greenock, to receive machinery, which is being supplied by Messrs. John G. Kincaid & Co., the engines having cylinders 25 in., 41 in. and 66 in. by 42-in. stroke, and two boilers 15 ft. 6 in. by 10 ft. 6 in. During construction the *Cheronea* was superintended by Captain Marsters, who is to command her.

Tantallon Castle.—On May 15th Messrs. Hawthorns & Co. launched at Leith an iron screw steam trawler named the *Tantallon Castle*, built to the order of Mr. J. A. Smith, of Hull. The dimensions are:—Length, 111 ft. 6 in.; breadth, 21 ft.; depth, 11 ft. 3 in. The vessel will be fitted by the builders with triple-expansion engines having cylinders 13 in., 21 in., and 34 in., by 24-in. stroke, with a working pressure of 170 lbs.

Thirlmere.—On May 15th Messrs. Robert Duncan & Co., Limited, launched on the Clyde a steel screw steamer of 280 ft. by 40 ft. by 20 ft. 6 in. moulded, constructed to carry a deadweight cargo of 3,000 tons on a draught of 11 ft. 6 in., and built to the highest class at Lloyd's, under the superintendence of Mr. George M'Farlane, for the Thirlmere Steamship Co., Limited, Manchester, of which Messrs. Herbert Watson & Co. are the managing owners. The steamer is fitted with direct steam windlass and steam steering gear, also full and efficient means for the rapid loading and discharging of cargo. She was named *Thirlmere* by Mrs. Herbert Watson, wife of the managing owner, and after the launch the vessel was towed to Glasgow for the purpose of having machinery fitted on board. She will be supplied with triple-expansion engines, having cylinders 20 in., 31½ in., and 53 in. by 36 in. stroke, by Messrs. Hall-Brown, Buttery & Co., Govan.

Orwell.—On May 18th Messrs. Charles Connell & Co., Whiteinch, launched from their Scotstoun shipbuilding yard a steel screw steamer, built to the order of Messrs. Jas. Gardiner & Co., shipowners, Glasgow. Her dimensions are:—Length, 354 ft.; breadth, 45 ft.; depth, moulded, 28 ft. 6 in.; with a deadweight capacity of about 6,000 tons. She has been built

to Lloyd's highest class as a three-decked steamer, with a full poop, bridge, and topgallant forecastle, also cellular double bottom right fore and aft for water ballast. Each hatch is equipped with winches and derricks completely arranged for speedy loading and discharging. The engines, which are of the most approved triple-expansion type, having cylinders 25 in., 40 in., and 66 in. diameter by 45 in. stroke, worked by two single-ended boilers, 14 ft. 10 in. diameter by 11 ft. 6 in. long, fitted with Howden's forced draught, are being constructed by Messrs. Dunsmuir & Jackson, Govan. As the vessel left the ways she was named *Orwell* by Miss Wilkie, Grangemouth.

Cidade de Cameta.—On May 18th there was launched from the shipbuilding yard of Messrs. Murdoch & Murray, at Port-Glasgow, a steel twin-screw steamer for passenger and cargo traffic on the River Amazon. The dimensions of the vessel are as follows:—Length, 140 ft.; breadth, 27 ft.; depth of hold, 8 ft.; tonnage, 300 tons. On leaving the ways the vessel was named *Cidade de Cameta* and was immediately taken in tow for Glasgow, where she will be fitted with two sets of compound engines by Messrs. Lees, Anderson & Co.

Nigeria.—On May 20th Messrs. David J. Dunlop & Co. launched at Port-Glasgow, to the order of the Royal Niger Co. Chartered and Limited, of London, for their service on the West Coast of Africa, the steel twin-screw steamer *Nigeria*. Her dimensions are:—Length, 148 ft.; breadth, 26 ft. 4 in.; depth, moulded, 9 ft. 6 in.; and she is designed to do her work on a specially light draught of water. She is to be fitted with two sets of compound surface-condensing engines, having cylinders 10 in. and 20 in. diameter by 15 in. stroke.

Abas Dadasheff.—On May 20th the Caledon Shipbuilding and Engineering Co., Limited, Dundee, launched a steel screw steamer which they have built to the order of a Russian firm. She is 224 ft. long, 32 ft. broad, and 16 ft. moulded depth. The engines are of the triple-expansion type, having cylinders 16 in., 27 in., and 44 in. respectively, with a piston stroke of 33 in. The vessel is intended for the Caspian Sea trade, she will be employed carrying oil in bulk, and was christened *Abas Dadasheff*.

LAUNCH.—GERMAN.

Nordland.—On May 6th a new steel screw steamer, built for Mr. Alfred Christensen, Steamship Co., Nordsoen, in Copenhagen, was launched by the Flensburg Shipbuilding Co. This steamer is classed 1st Division Veritas, and has dimensions:—260 ft. by 36 ft. by 17 ft. 7 in. On leaving the ways she was christened by Miss Holme.

TRIAL TRIPS.

Aragonia.—On April 27th a new twin-screw steamer, built for the Hamburg-America Line by the Flensburg Shipbuilding Co., was taken on trial in the Flensburg Fjord. This steamer has dimensions 420 ft., by 50 ft., by 33 ft., and is classed 100 A1 at British Lloyd's. Her engines, about 1,000 H.P. each, built on the triple-expansion system, give the vessel a speed of average 12-knots.

Manoussis.—On April 29th on the measured mile off Whitley, was tried the s.s. *Manoussis*, built by Messrs. C. S. Swan & Hunter, Limited, of which Messrs. Galbraith, Pembroke & Co., of London, are the managing owners. The vessel is 275 ft. long, by 39 ft. 6 in. beam by 20 ft. 3 in. moulded depth, carrying a deadweight of 3,070 tons on 18 ft. 9 in. The engines are triple expansion, built by the Central Marine Engine Works, of West Hartlepool, the cylinders being 21 in., 33 in., and 56 in. diameter, by 36 in. stroke, and the working pressure 160 lbs. The vessel was in ballast trim, the mean speed being 10¼ knots, A strong S.S.W. wind was blowing at the time, with a choppy sea. The engines worked very satisfactorily, and the various trials of steering and letting go anchors, &c., proved quite efficient. The vessel will be commanded by Captain Bistis, who has superintended the vessel during construction, the engines having been superintended by Mr. Clarke, both being present at the trial trip.

Wakasa Maru.—On April 29th and 30th the large twin-screw steamer *Wakasa Maru*, 5,873 tons gross, went down the Clyde and ran her speed and coal consumption trials. During both days her machinery worked without the slightest hitch, and gave every satisfaction to the owners' representatives, who were on board. A mean speed of 14½ knots was easily obtained. The *Wakasa Maru* is the third steamer built by Messrs. David and William Henderson & Co., Partick, for the Nippon Yusen Kaisha, of Tokio, their representative in this country being Mr. A. R. Brown, Consul for Japan, Glasgow. Messrs. Henderson have other two steamers of similar size in hand for the same owners.

Wreathier.—On Tuesday, May 4th, the s.s. *Wreathier*, built by Messrs. Craig, Taylor & Co., of the Thornaby Shipbuilding Yard, to the order of Messrs. The Goole and West Riding Steam Shipping Co., Limited, had a very successful trial trip. The dimensions of the vessel are 208 ft. by 31 ft. by 13 ft. 7 in.; short poop, raised quarter deck, long bridge, and top gallant forecastle, cellular bottom fore and aft, also ballast in the peaks. She is fitted with three steam winches, steam steering gear, separate donkey boiler, and Messrs. Emerson, Walker & Thompson Brothers' patent direct steam quick warping windlass. The engines, by Messrs. MacColl & Pollock, of the Wreath Quay Engine Works, Sunderland, are 17 in., 28½ in., 46 in., and 30 in. stroke, with boiler working at 160 lbs. pressure. The hull and machinery have been constructed under the personal supervision of Mr. Geo. H. Strong, M.I.N.A., consulting engineer, Hull, who was present at the trial as representing the owners. Over a series of runs on the measured mile, a mean speed of 14 knots was obtained, and this was considered very highly satisfactory by the owners. The vessel will carry a large cargo on a light draught of water, and is particularly suited for the Goole trade. In addition to the chairman of the company (Mr. E. W. Hunter), and the secretary (Mr. H. W. Ezard), the following gentlemen were also present:—Mr. B. Parrish, Mr. Bell, Mr. Best, Mr. Earnshaw, Mr. Webster, Mr. Hunter, jun., Mr. Wilson, Mr. A. Blyth, Mr. Buttle, Mr. Hordenby, and Mr. B. Brown. After the trial trip the vessel at once proceeded to the Tyne, under the command of Captain C. Moore.

Euro.—On May 6th the steam-tug *Euro* was taken on her trial trip at sea, when four runs on the measured mile were made; a mean speed of nearly 13 knots was obtained. The vessel was partly loaded with coal, and in water ballast. The machinery worked in the most satisfactory manner possible, vibration under the large proportionate power being nearly absent. A trial of the supplementary machinery was made, and the salvage pump showed itself capable of dealing with a large quantity of water. The vessel's dimensions are 130 ft. 1 in. by 22 ft. 6 in. by 13 ft. 3 in. She is built to Lloyd's class, and is tastefully fitted and completed in first-class style for tug service; she has very nicely fitted accommodation aft in view of passengers being on board. The captain's, officers', and engineers' rooms are nicely fitted and comfortably arranged for hot climates, and even the steward's pantry is fitted out in polished wood and well furnished. Steam steering gear is fitted on bridge. The propelling machinery is well proportioned, full attention being given to her trade. She is well lighted and ventilated, and is fitted with feed-heater and evaporator. Her cylinders are of the following dimensions, 16 in., 26 in., and 43 in., by 30 in. stroke, with ample boiler power. She has been built by Messrs. Gourlay Brothers, of Dundee, under the inspection of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool. The vessel will proceed to her destination after loading.

T. R. Thompson.—On May 7th the s.s. *T. R. Thompson* went on her trial trip, when a speed of nearly 12 knots was attained. The vessel, built for Mr. Westoll, was launched from the shipbuilding yard of Messrs. Short Bros., and is of the following dimensions: Length, 360 ft.; breadth, 47 ft.; and depth, moulded, 27 ft. 4 in.; the deadweight carrying capacity being 5,800 tons on a moderate draught. The engines and boilers have been fitted by Messrs. J. Dickinson & Sons, Limited, the cylinders being 24½ in., 40 in., and 66 in., in diameter by 45 in stroke, steam being supplied by two large steel boilers at 16. bs. pressure

Uranus.—On Saturday, May 8th, the s.s. *Uranus*, built by the Sunderland Shipbuilding Co., Limited, was taken to sea on her official trial trip. The dimensions are, 210 ft. by 32 ft. by 16½ ft. moulded, built to the highest class at Lloyd's under special survey, having raised quarter-deck bridge and topgallant forecastle. The engineers' messroom and all accommodation for captain and officers is placed amidships. The vessel is provided with steam winches by Mr. R. Welford, patent

windlass by Messrs. Clarke, Chapman & Co., and combined hand and steam steering gear, by Messrs. Donkin & Co., and is built particularly for the owners' Spanish line, having large cubic capacity and will carry a deadweight of 1,500 tons on 15 ft. mean draught. The engines are tri-compound, having cylinders 17 in., 28 in., 46 in. by 30 in. stroke, built by the North-Eastern Marine Engineering Co., Limited, Sunderland. During the whole period of the steamer's trials the machinery worked without a hitch, and a mean speed of 10½ knots was obtained, which was considered most satisfactory. During construction both hull and machinery have been inspected by Mr. Siemens and Capt. Bauer on behalf of the owners, the Neptun Steamship Co., of Bremen.

Avon.—The twin-screw steamship *Avon*, which has just been completed by Messrs. Wigham Richardson & Co. at their Neptune Works, Newcastle-on-Tyne, went for a highly successful trial trip off the coast on Thursday, May 13th. The steamer is of steel, and will take the highest class in Lloyd's Register; she is 300 ft. in length, and has two masts with a light fore-and-aft rig. The vessel has most luxurious accommodation for a large number of passengers. The first-class, of whom there are 100, have a large dining saloon on the bridge deck amidships, and forward of it there is a large music saloon. A smoking-room is also provided on the same deck aft. The ladies' room with the stewardesses' room, lavatories, &c., are on the main deck. The second-class passengers are accommodated aft in the poop, and there is also accommodation for a large number of third-class. The entire passenger accommodation has been arranged with the greatest taste and care for the comfort of those travelling. The propelling machinery consists of two sets of triple-expansion engines, each having four cylinders and four cranks, self-balanced on the Yarrow, Schlick & Tweedy system. Engines which are constructed on this system, do not vibrate in the least when running, and, therefore, a grave source of discomfort to passengers is removed. This steamer is the only coasting vessel on the East Coast which is so fitted, and her owners confidently expect her on this account, without taking into account her high speed and luxurious accommodation, to become at once the favourite of the public who travel between London and Scotland by sea. The arrangements for working the ship and her cargo are also of the most modern and improved design, including four powerful steam and hydraulic cranes, and steam and hydraulic steering gear (all Brown's patents), all of which have the great advantage that, being noiseless, they do not disturb the passengers. The steamer has been built to the order of Carron Co., for their London and Grangemouth Service. She is a faster boat, and generally a great improvement over the *Grange*, which was built a few years ago by Messrs. Wigham Richardson & Co. for the same company, and which has proved herself a most popular boat on the London and Grangemouth route. The vessel has been built under the supervision of Mr. Frank P. Spears, the marine superintendent for the owners, who represented them on the trial trip, when everything worked without a hitch, giving entire satisfaction to both owners and builders, the absence of vibrations in the engines being an earnest of comfort for the passengers in future. The speed attained was also most satisfactory, being in excess of the guaranteed speed. The builders were represented on the trial trip by Mr. Tweedy and Mr. J. Denham Christie.

Constantin.—Lately the Russian passenger steamer *Constantin* proceeded from the Tyne for her official trial trip. The vessel was lately sent to the North-Eastern Marine Engineering Co., Limited, at Wallsend-on-Tyne, who have replaced the old machinery with twin tri-compound engines of the most modern type, and who have also entirely remodelled the vessel and passenger accommodation. A complete electric light installation has also been fitted by Messrs. Clarke, Chapman & Co., Limited, Gateshead. On the trial trip the new machinery worked without the slightest hitch, and gave entire satisfaction to the owners' representatives, who expressed themselves as highly pleased with all the alterations and improvements. The consumption trials of the vessel showed that, though the consumption of coals is exactly half of what it previously was, the speed had been increased from 10¾ to 11¼ knots. Mr. James Cormack, of Messrs. J. Cormack & Co., Leith, the owners' agents, was present at the trial, as also Mr. Daniel Cormack, who superintended the work. The vessel is one of the fleet of steamers trading between Riga and St. Petersburg, is a handsome steamer, elaborately fitted up for 50 first-class and about 300 second-class passengers, and is under the command of Captain Wolter.

Mayflower.—This vessel, which has been constructed by the Clydebank Engineering and Shipbuilding Co., Limited, has completed an extensive series of trials. On May 3rd the vessel proceeded down the firth, when the day was occupied by preliminary and progressive trials. On the following day a lengthy coal-consumption trial was successfully accomplished, and on May 6th the official speed trial was run between the Cloch and Cumbrae lights, when the mean speed was found to be 16¾ knots. She has a length of 320 ft. over all, a moulded breadth of 36 ft. 6 in., and moulded depth of 21 ft., the gross tonnage being 1,780 tons. She is at present being fitted out in a most luxurious and complete manner, and it will be some weeks before she is finally ready for sea. The *Mayflower* has been designed by Mr. G. L. Watson to the order of Mr. Ogden Goelet.

Kamakura Maru.—On May 7th the *Kamakura Maru*, the first of the twin-screw steamers placed with Messrs. Workman, Clark & Co., Limited, Belfast, by Mr. A. R. Brown, Glasgow, for the Nippon Yusen Kaisha of Japan, completed her official trials on the Clyde. The vessel is 445 ft. long, 49 ft. 5 in. broad, 33 ft. 6 in. deep, and she has been built to Lloyd's highest class and in conformity with the Board of Trade regulations for passenger services. Owing to the fire which destroyed part of the builders' engine work several months ago, the engines had to be constructed outside, and Messrs. Barclay, Curle & Co., Limited, Whiteinch, undertook the work. The engines are of the triple-expansion type. The boilers were supplied by the builders. The average of runs on the measured mile at Skelmorlie, and of a six hours' run subsequently, was 14¾ knots, which was in excess of the contract.

Ireland.—On May 8th the new steam trawler *Ireland*, built by Messrs. Cook, Welton, & Gemmell, to the order of the Hull Steam Fishing and Ice Co., Limited, had her official trials. Her dimensions are 98 ft. long by 20 ft. 6 in. breadth, by 11 ft. depth of hold, and fitted with machinery by Messrs. Amos & Smith. The run to sea proved the vessel's speed and sea-going qualities to be all that could be desired.

Hermod.—Lately the new screw steamer *Hermod*, built by Messrs. Wood, Skinner & Co., Bill Quay-on-Tyne, to the order of Messrs. Brunsgaard, Kjostered & Co, Dram, Norway, had a most successful official trial trip on the measured mile off the Tyne. The vessel is of the single-deck type, with bridge and topgallant forecastle. She is 248 ft. long, 35 ft. wide, and 20 ft. 6 in. in depth moulded, and has been constructed to attain the highest class in Norwegian Veritas. The vessel is fitted with all the latest appliances for facilitating rapid loading and discharging of cargo. The machinery has been constructed by the North-Eastern Marine Engineering Co., Limited, at their Wallsend works, and consists of a set of triple-expansion engines, having cylinders 18½ in., 30 in., and 40 in. diameter, by 33 in. stroke, with a large steel boiler, and amongst the auxiliary machinery in the engine department is a "North-Eastern" combined feed heater and cleaner, together with a "North-Eastern" evaporator. Despite the unfavourable state of the weather the trial of both vessel and machinery proved in every way satisfactory.

Jupiter.—On May 10th this oil tank steamer, built by Messrs. Wm. Dobson & Co., under Bureau Veritas rules, to the order of Messrs. Lane & MacAndrew, of London, for service on the Volga, was taken on her trial trip, when very satisfactory runs were made on the measured mile, the speed obtained being a little over 11 knots. The vessel is of the following dimensions:—275 ft. by 32 ft. by 19 ft. 8 in., and is fitted with twin-screw compound condensing engines, having cylinders 24 in. and 46 in. by 27 in., built by the Wallsend Slipway and Engineering Co., of Newcastle, and takes steam from two large boilers fitted for oil burning as well as coal consumption. During the run the auxiliary machinery was thoroughly tried, and found very satisfactory in every respect. She is constructed under the superintendence of Messrs. Flannery, Baggallay, and Johnson, of London and Liverpool, and is built in two sections in order to pass the Russian canals, and is capable of being separated or jointed together afloat, special pontoons being supplied and sent out with the vessel to keep her in trim during the operation.

Excelsior.—On May 14th the new steamer *Excelsior*, which was recently launched by Messrs. Gourlay Brothers & Co. for

Australian owners, made her official trial trip. The vessel proceeded under the charge of Captain Farrow as far as Bell Rock. Her compasses having been adjusted, she returned to the river, and over the measured mile a speed of 11¼ knots was attained. The performance of the steamer was considered satisfactory.

Lovart.—On May 15th the steel-screw steamer *Lovart*, of 1,030 tons gross, built by Messrs. Carmichael, Maclean & Co., Greenock, and engined by Messrs. Muir & Houston, Glasgow, for Messrs. Love & Stewart, shipowners, Glasgow and Bo'ness, ran her official trial trip on the Clyde. Loaded with her full cargo, the *Lovart*, on her run over the measured mile at Skelmorlie, attained a speed of 9¼ knots per hour, which is above the guarantee. The engines worked smoothly, and the results obtained on the trial were considered highly satisfactory. The *Lovart*, under the command of Captain Thomson, left the Clyde the same evening for the Baltic.

Northville.—On May 15th the new steamer *Northville*, of North Shields, built by Messrs. John Readhead & Sons, to the order of Messrs. Balls & Stansfield, proceeded to sea loaded, when a trial of the engines and speed took place. The steamer was run at full continuous steaming for three hours, up and down the coast, and the speed tested on the measured mile off Whitley was over 9½ knots. The trial was considered thoroughly satisfactory to builders and owners. The *Northville* afterwards proceeded on her voyage to Odessa under the command of Capt. Geo. Hair.

Briton.—On Saturday, May 15th, the s.s. *Briton*, built by the Sunderland Shipbuilding Co., Limited, was taken to sea on her trial trip, when a speed of 11¼ knots was obtained, the vessel being fully loaded, the machinery working with perfect smoothness; the owner, who was on board, being more than satisfied with the results obtained. The steamer is 206 ft. B.P., 30 ft. broad, and 14 ft. 2 in. deep, classed 100 A1 at Lloyd's, under special survey, having raised quarter-deck, bridge, and topgallant forecastle. The officers' and engineers' messroom and accommodation is placed amidships, whilst the captain is berthed in house on deck. The deck machinery consists of direct steam windlass by Messrs. Clarke, Chapman & Co., winches by Mr. R. Welford, of Pallion, and steering gear by Messrs. Donkin & Co. Large hatches are provided and arranged to suit the trade for which the boat is intended. The engines are tri-compound by Messrs. the North Eastern Marine Engineering Co., Limited, Sunderland, having cylinders 17 in., 28 in., and 46 in., by 30 in. stroke, 175 lbs. working pressure, feedheater, evaporator, and all the latest improvements in marine engineering. A complete installation of electric light is fitted by Messrs. the Sunderland Forge and Engineering Co., Limited. The vessel is built upon very fine lines for a steamer of this type, and upon a net register of 246 tons, carries 1,000 tons, and draws 13 ft. when fully loaded. Several vessels of this class have been built by this company, all carrying a very large cargo upon a similarly small net tonnage. During construction both hull and machinery have been inspected by Mr. Reed on behalf of the owner, Mr. E. Hawthorn, of London.

Dresden.—The Great Eastern Railway Co. is just adding to its already fine fleet of passenger boats plying on the new route to the north of Europe from Harwich, via the Hook of Holland, a fine twin-screw steamer named the *Dresden*, which has been built at Hull by Earle's Shipbuilding and Engineering Co., Limited. The ship, which is 302 ft. long, is 2 ft. wider than her four predecessors, and although possessing machinery of practically the same power, yet her lines being somewhat better she has attained a higher speed. The contract was for 17½ knots with a load on board equivalent to her complement of passengers and the amount of cargo usually carried; but on the full power trials lately, both on the measured mile and on the long distance run, the average rate was much in excess of that stipulated for; indeed, on a course covering more than 100 miles, the ship maintained an average speed of close upon 19 knots per hour under conditions of weather that were distinctly unfavourable, while the working of the machinery was in every respect most satisfactory to all concerned, and highly creditable to the builders. The higher rate of speed the *Dresden* is capable of attaining and the other improvements in various details suggested by previous experience with these ships will no doubt cause her to rapidly become a favourite with travellers frequenting this service.

Arlington.—On May 19th the s.s *Arlington* had her trial trip. The *Arlington* is a handsome steamer, built by Messrs. Gray & Co. for the Deddington Steamship Co., Limited, of Hull (Messrs. H. Samman & Co., managers). Her principal dimensions are:—Length, over all, 336 ft.; breadth, 47 ft.; and depth, 24 ft. 10 in. She is built to Lloyd's highest class. Her engines are of the triple-expansion type, having cylinders 24 in., 38 in., and 64 in. in diameter, with a piston stroke of 42 in., and have been supplied by the Central Marine Engine Works. The boilers are of steel of ample size, and work at a pressure of 170 lbs. per square inch. The trial was witnessed by Mr. W. A. Sage (under whose superintendence the vessel and her machinery have been constructed), Captain Murrell on behalf of the shipbuilders, and Mr. James Lindsay on behalf of the engine builders. The trial was in every way satisfactory, and the vessel was able on its conclusion to set her course for her outward passage to Montreal, where she is to receive her first cargo.

Beverly.—On May 20th previous to her departure for Ardrossan to load, the screw steamer *Beverly* proceeded down Belfast Lough on her trial trip. This vessel is similar in all respects to the *Belvidere* recently completed by Messrs. Workman, Clark & Co., Limited, for the same owners, Messrs. R. and C. Allan, of Glasgow, and specially designed for the passenger and fruit trade from the West Indies to the United States. She has been constructed to the highest class of the British Corporation for both hull and machinery. The principal dimensions being:—Length, 255 ft.; breadth, 34 ft.; depth, 24 ft. 3 in., and a gross tonnage of 1,520. A cellular double-bottom extends fore and aft for water ballast. There are three decks, the upper being of teak, the others being sparred for fruit-carrying purposes. The holds are sheeted for the same purpose. Ventilation and heating being an essential point in this trade special care has been taken in making the holds complete in this respect by means of heating pipes, &c. The passenger accommodation is all above deck in houses extending over the entire midship portion of the vessel, with the saloon in the centre, and dining accommodation for 40 passengers. On the promenade deck above are situated the music-room, entrance hall, smoking-room, &c., all furnished and upholstered in a very handsome manner. The machinery has also been constructed at the builders' works of the most recent style of triple-expansion engines. After adjusting the compasses the vessel was run over the measured mile when a speed of 15¾ knots was obtained. In a few days the *Beverly* will proceed to Ardrossan to load before proceeding to take up her station in the West Indies, where her yacht-like appearance and graceful outline is certain to command admiration, and her accommodation make her popular with passengers.

Unity.—On May 21st the steamer *Unity*, which has undergone extensive alterations at the hands of the North-Eastern Marine Engineering Co., Limited, at their Wallsend works, under the personal supervision of Mr. A. Macfarlane, of Sunderland, the owners' superintendent; put to sea to test her new machinery preparatory to sailing to Cronstadt, with a cargo of coals shipped at Sunderland. The alterations included the removal of the ship's boilers, which were replaced by a high-pressure boiler of the latest type, thus effecting a large saving in deadweight and a corresponding increase in carrying capacity. Her engines were at the same time altered to the high pressure compound system and all the latest improvements introduced. Notwithstanding the heavy swell which was running the steamer behaved splendidly, and a high rate of speed was obtained, the engines working smoothly and without perceptible vibration. Mr. J. Crosby represented Mr. Macfarlane during the trial and expressed his entire satisfaction with the working of the machinery and the way the whole of the work had been carried out. The *Unity* is owned by Messrs. Reed, M'Nair & Co., of Glasgow, who, acting under the council of Mr. Macfarlane, had the steamer brought up to the requirements and highest classification of Det Norske Veritas and Lloyd's Registry.

Eveline.—On May 21st the s.s. *Eveline*, a fine steel screw steamer built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Thos. Bell & Co., of Newcastle, left the port for her trial trip. She takes Lloyd's highest class, and is of the following dimensions:—Length, over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. Her engines are of the triple-expansion type, supplied by the Central Marine Engine Works of William Gray & Co., and have cylinders 23 in., 36½ in., and

62 in. diameter by 39 in. stroke, and two large steel boilers supply the steam at a working pressure of 160 lbs. per square inch. A complete outfit for a first-class cargo vessel is carried. There were present Captain Danby and Mr. Crammond on behalf of the owners, Captain Murrell representing the builders of the ship, and Mr. T. Mudd those of the engines. The trial was in every way satisfactory, and on its conclusion the vessel at once proceeded on her voyage for Quebec to load.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

A TOWAGE ACCIDENT.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—I see by the April number of "M.E." an account of the unfortunate accident on board of the steamer *Templemore*, of our line, which is altogether an erroneous statement given to you. I beg leave to give you the true version as it occurred.

In connecting the two ships, so that my steamer should steer and the *Templemore* to tow, I ran out to him a 6-in. steel wire hawser to connect unto his one of the same size, and by the aid of these two wire hawsers, connected to my bower cable, we could have had a fine tow line; however, this never was carried out, because the shackle connecting the wires got jammed in the after chocks, while paying out, and whilst engaged in trying to clear it the two ships drifted apart, carrying away the chock. The captain, boatswain, carpenter, and two A.B.'s were jammed to the side of the steel wheel-house; the chief officer, being abaft the wheel-house, only had one leg broken, whilst the others had both legs shattered and torn frightfully, as the wire being freed ran out across their legs and held them in that position until the wire parted. The captain and one A.B. only survived three hours; the others are progressing favourably in the Liverpool hospital. The wind at the time was a gale with a high mountainous sea. When the weather subsided, viz., two days after, I took him in tow, using a 6-in. steel hawser on each quarter and 45 fathoms on each of his bower cables, and by this means towed him safely to Liverpool, thus reversing the usual order of things, "towing a rudderless ship."

In December last I towed the oil tank steamer, *Beacon Light*, by the same means, only with as much as 90 fathoms on each of his cables, and encountering one of the severest gales of last winter, accomplishing my task in 7½ days.

A wire by itself is practically useless; you must have a spring, and none is better than the bower cable, as the friction drawing the same up through the water acts as a brake and spring at the same time.

Thanking you in anticipation for the insertion of this correction,

I remain, dear Sir,
Respectfully yours,
W. H. MOORE, R.N.R.,
Master.

S.S. Ulstermore,
Baltimore, U.S.A.
May 14th, 1897.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from April 7th, to May 12th, 1897.

7128 L. de Bruycker. Glaze paint for ships' bottoms.
7161 W. J. Crossley and J. Atkinson. Exhaust valves.
7194 H. Broers. Boiler.
7247 J. Hale. Propelling and steering ships.
7249 G. M. Stonehouse and C. H. Perkins. Forced draught furnaces.
7267 E. A. McLachlan. Propelling and steering boats.
7278 J. Worsnop. Metallic packing.
7281 B. M. Fletcher. Submerged floating apparatus.
7291 J. W. Robertson. Furnaces.
7352 T. Downie. Marine boilers.
7374 E. M. Mallett. Steam generators.
7375 C. Junge. Instantaneous steam generators.
7392 H. C. Werner. Preventing the sinking of ships.
7396 W. P. Thompson. (T. W. McMames, S. T. Price, and J. C. Burneson, United States.) Steam boilers
7403 W. H. Bushell and L. R. S. Tomalin. Forcing waste steam into boilers.
7456 E. Sharer. Side-lights for ships.
7482 J. M. M. Truffault. Steam generators.
7583 L. Leclerc, P. Landais, and R. Jaeger. Steam generators.
7586 C. J. Copeland. Screw propeller shafts.
7603 W. Shears. Rudders.
7605 J. E. Taylor. Pistons.
7616 J. T. Stewart. Steam generators.
7679 J. C. Hastie. Coverings for steam pipes.
7681 J. N. Keagan. Reefing of sails.
7711 R. Harris. Communication between ship and shore.
7748 A. H. Harrison. Winches used for fishing.
7766 P. Brotherhood. Leather packing rings.
7783 Sir Edward Green, Bart., and F. W. Green. Boilers.
7797 Sir E. Green, Bart., and T. W. Green. Boilers.
7811 J. W. Reed. Steam boilers.
7827 N. P. Donaldson. Recording speed of ships.
7851 E. Nelson. Non-conducting boiler coverings.
7860 A. Krüche. Appliances for steering ships.
7972 E. Dagnall and A. W. Southey. Steam generators.
7983 J. Lewthwaite. Engines.
7998 W. G. Potter. Governors for marine engines.
8020 R. W. Stokoe. Marine boiler door.
8089 F. Edwards. Ships' port and dead lights.
8097 T. Clarkson. Tubulous steam boilers.
8134 A. H. and W. Wildman. Water-tube boilers.
8162 A. Viert. Propellers.
8207 F. M. B. Bertram and G. Robinson. Slider boats.
8212 S. Berditschewsky-Apostoloff. Submarine vessels.
8218 B. M. Fletcher. Utilising the power of waves.
8233 H. Paucksch. Purifying, &c., feed-water.
8247 J. Laidlaw and J. W. Macfarlane. Centrifugal machines.
8283 T. Lishman. Steam generators.
8304 A. F. Spooner. (F. Bouilly and T. Tenaud, France.) Boats.
8318 C. W. Pinkney. Engines.
8319 W. Alexandroff and A. Coumbary. Boats.
8361 J. and W. Young. Ships' water-closet.
8395 E. Edwards. (C. Richter, Austria.) Valve-gear for engines.
8414 A. H. Crockford and A. S. Vose. Gauges.
8417 T. W. Southington and J. T. Mitchell. Propellers.
8423 W. M. Greaves. Water-tubes for steam boilers.
8429 D. Stuart. Greater increase of speed of ships.
8433 W. Stewart. Indicating the speed of ships.
8454 R. Kilburn. Chucks.
8457 J. Muir, E. A. Morse, and F. O. Pierson. Valve.
8498 A. G. Mumford. Boilers.
8563 C. S. Snell. Submarine cable-laying appliances.
8577 B. K. Jamison. Treatment of armour plates.
8580 W. H. Wilson and R. B. Mitchell. Steam engines.
8595 T. C. Palmer. Steam generators.
8604 E. Makin, jun. Steam generators.
8605 E. Makin, jun. Steam boilers.
8627 W. C. J. Copeman. Cable stoppers for ships.
8762 O. D. Orvis. Generators.
8769 A. M. Wylie and L. Cohen. Pontoon bridges.
8792 F. Krefft. Propelling vessels.
8812 T. G. Stevens. Marine wheel controller.
8828 C. W. James and G. L. I. Wolley. Boat propulsion.
8937 T. Bredsdorff. Construction of cargo vessels.
9046 R. H. Smith Bucket-ladder dredger, &c.
9144 C. R. James. Securing tubes in boilers.
9145 A. Martini. Propellers for steamships.
9159 R. Cowell and R. W. Mason. Otter trawl board.
9177 J. Weir. Tubulous boilers.

9185 T. G. Bowick. Propulsion of ships.
9187 W. O. A. Lowe. Steam boiler furnaces.
9198 E. J. Preston. Ships' steering telegraphs.
9214 J. Hopkinson and J. Hopkinson & Co., Limited. Valves.
9226 G Rockliffe. Door frames for ships.
9243 J. G. Lyon. Boilers.
9321 E. Latham and E. G. Guyot. Steam condenser.
9325 W. and A. R. Crawford. Watertight doors.
9331 D. and J. Burnett. Steam generators.
9349 G. Newsum. Construction of boilers.
9379 C. Junge (W. B. Pierce, United States.) Removing scale from boilers.
9382 F. A. Knapp and G. Goodwin. Marine vessels.
9404 E. E. Wigzell. Water-tube steam boilers.
9433 G. T. Epstein. Ships' boats.
9556 R. H. Field. Propelling boats.
9581 J. J. Perrow, A. J. Newton, and M. King. Piston heads.
9585 H. Goodwin. Gauge.
9670 H. Sheaf. Clip for holding boat sails.
9709 J. Durnford. Torpedo nets.
9713 J. C. Leaver. Steering of vessels.
9721 A. C. Moffatt. Feed-water heaters.
9741 C. Dowsen. Boiler tube fastenings.
9812 E. Pilkington. Seamless metallic tubes.
9817 R. Parkin. Valve gear for steam engines.
9831 W. J. Greenland. Piston packing.
9963 A. H. L. Grivel. Internal combustion engines.
9983 W. J. Roberts and J. R. Jones. Utilising tidal power.
10050 J. C. Dodd. Indicating the course of a ship.
10070 J. O. O'Brien (La Compagnie Générale des Automobiles, France.) Boilers.
10081 R. R. Symon and H. A. House, jun. Steam engines.
10088 T. L. Livingston and J. Sanderson. Sea-going vessels.
10089 J. H. Stone. Hurricane lanterns.
10090 W. Gowan. Collapsible lifeboats.
10097 C. E. Henriod. Internal combustion engines.
10202 C. Humfrey. Condensers.
10204 H. F. Phillips. Navigable vessels.
10210 A. G. Melhuish. Internal combustion engines.
10219 J. Morton. Tile for covering steam boilers.
10229 B. A. Dobson and J. H. Pickup. Regulating the feed of engines.
10323 F. W. E. King. Reducing friction on slide valves.
10366 P. Cuber and F. and K. Skowronck. Screw propellers.
10391 H. Vincent. Rotary engines.
10392 T. Harris. Boiler covers.
10407 C. and F. Keizer. Steam generators.
10457 J. T. Austin. Regulating engines of ships.
10497 A. C. Mott. Steam generators.
10504 W. P. Thompson. (P. Janke, Germany.) Speed-recording device for ships.
10624 W. and W. A. Clark. Feed-water heaters.
10668 J. C. Robinson. Suspending gear for boats.
10689 C. M. Weeks. Steam boilers.
10706 H. R. O. Friederici. Boiler furnaces.
10708 E. A. Reeves. Compasses.
10733 R. and B. Ray. Sea-sounding appliances.
10743 T. Prescott. (R. Holdcroft, Russia.) Steam valves.
10751 J. Whitehead. Chocks or housings for ships' boats.
10780 W. Elliott and W. Garrood. Steam boilers.
10843 J. Scott. Stern tubes for steam vessels.

BOARD OF TRADE EXAMINATIONS.

EXTRA FIRST CLASS.

April 24th, 1897.—Miller, T. M. ..... Ex. 1C Dundee
" 24th " —Paterson, F. ..... Ex. 1C S'nd'land
" 24th " —Spencer, G. L..... Ex. 1C Cardiff
" 24th " —Tarrant, A. ..... Ex. 1C London
May 1st " —Miller, J. ..... Ex. 1C Glasgow

NOTE.—1C denotes First Class; 2C, Second Class.

April 24th, 1897.

Allibon, F. S. .. 2C Glasgow
Anderson, S. .. 2C London
Arrowsmith, C. 2C Liverpool
Bird, S. A. .... 1C Cardiff
Booth, J. D. .. 2C Dundee
Brand, J. H. .. 1C London
Brown, J..... 1C W.H'pool
Casebourne, F. 1C N.Shields
Chalcraft, L. F. 2C Cardiff
Conner, J. .... 1C W.H'pool
Cossom, E. W. 1C London
Coyles, T. .... 2C Aberdeen
Cuthbert, C. G. 1C Dundee
Dewey, H. C... 2C London
Duncan, J. P... 2C Aberdeen
Edwards, John 1C Liverpool
Forsyth, James 1C "
Fyfe, R. S. .... 1C Dundee
Galbraith, A. .. 2C Glasgow
Gardner, McK. 1C "
Gibson, S. B. .. 2C "
Gordon, C. .... 1C Aberdeen
Graham, W. C. 2C Dundee
Greig, Andrew 1C Liverpool
Hill, A. ..... 1C Aberdeen
Hinde, A. E.... 2C London
Holman, J. N... 2C W.H'pool
Hughes, R. .... 2C Cardiff
Hunter, C. A. .. 2C W.H'pool
Lakeman, W. P. 1C Plymouth
Lambert, W. .. 1C N.Shields
Lamont, D. .... 2C Glasgow
Lillies, W. .... 2C W.H'pool
Love, J. ..... 2C Glasgow
Loveridge, F. C. 1C W.H'pool
MacVicar, J. L. 1C London
Martin, W. G... 2C Glasgow
Masson, A. C... 1C "
Mathys, F. .... 2C London
Mayson, H. R... 1C W.H'pool
McCallum, A... 2C Cardiff
McFadyen, J. ..1C Glasgow
McIntyre, W. A. 2C Dundee
Mercer, W. .... 2C W.H'pool
Meredith, G. .. 1C "
Milne, A. ..... 1C Aberdeen
Montgomery, R. 2C Glasgow
Mowbray, F. W. 2C W.H'pool
Newman, G. .. 1C "
Pairman, G. .. 1C Glasgow
Percy, G. E..... 2C "
Pond, J. R. .... 2C Cardiff
Raven, W. H... 2C "
Robertson, A. L. 1C Dundee
Ross, W. D .... 2C Glasgow
Rossiter, W. M. 2C London
Rowland, R. .. 2C N.Shields
Scawn, A. .... 2C Plymouth
Shepherd, J. .. 2C N.Shields
Smith, J. C. .. 2C Cardiff
Smurthwaite, F. 2C W.H'pool
Stocks, J..... 1C Cardiff
Sutton, Fred. G. 1C Liverpool
Sutton, L. .... 2C London
Thomas, W.... 1C Cardiff
Thornton, J. H. 2C W.H'pool
Warren, W. G... 2C London
White, A..... 2C Glasgow
White, J. G..... 1C N.Shields
Whittet, A. .... 1C Dundee
Wilson, W. .... 2C W.H'pool

May 1st, 1897.

Anderson, J. .. 1C London
Bearpark, F. .. 1C S'nd'land
Campbell, McR. 1C Glasgow
Cockayne, Fred. 2C Liverpool
Glover, Sam. .. 1C "
Hanson, Henry 2C "
Hayward, Wm. 2C Liverpool
Jameson, T..... 2C S'nd'land
McDougall, W. 2C Glasgow
McDowall, J. R. 1C London
Paynter, J. E... 1C S'nd'land
Ritchie, G. D... 2C London
Roger, H..... 2C "
Smith, R.J..... 1C S'nd'land
Sommerville, A. 2C London
Webster, J. G... 1C "
Woodward, A... 1C S'nd'land

May 8th, 1897.

Beacock, G. D. 2C Hull
Bevan, W. T. .. 2C Cardiff
Fowler, George 1C Liverpool
Fraser, D. .... 1C Leith
Godfrey, T. .... 1C London
Hughes, C. R. .. 1C "
Irvine, G..... 2C Leith
Kelly, R. ..... 1C London
Kirkwood, T. .. 2C Leith
Mauley, T. C. .. 2C Cardiff
McQueen, D. .. 1C Leith
Moloney, D..... 2C Cardiff
Moreland, J. A. 2C London
Morgan, O. .... 1C Cardiff
Moss, Chas. R. 2C Liverpool
Press, T. C..... 1C London
Prinniger, E. I. 2C "
Russell, D. W... 1C Cardiff
Scott, J. W..... 2C Leith
Seed, T. J. .... 2C London
Shotton, Thos. 1C N.Shields
Skinner, W. .. 2C Leith
Stokes, C..... 2C Hull

May 15th, 1897.

Archibald, H.K. 2C Greenock
Ayre, E. A. .... 1C N.Shields
Barrett, A. J. . 1C London
Boyes, W. J. .. 2C "
Cairns, J..... 2C N.Shields
Cockayne, Wm. 2C Liverpool
Crabbie, R. T. 2C "
Davidson, A. .. 1C Greenock
Devlin, J. S. .. 1C "
Fernandez, Jos. 1C Liverpool
Hebden, Fred. 1C "
Jones, Hugh .. 2C "
Jordan, A. E. .. 2C London
Kelly, Frank .. 1C Liverpool
McCormack, H. 2C Dublin
McGill, J..... 1C N.Shields
Minshaw, R. B. 1C Liverpool
Morrison, S. K. 1C Dublin
Newrick, J. M. 1C N.Shields
Payne, Leslie F. 1C Liverpool
Proudfoot, F. .. 2C Greenock
Rawsthorne, T. 2C Liverpool
Redford, A. E... 2C N.Shields
Reid, P. ..... 1C Dublin
Roe, Harry W... 2C Liverpool
Samuel, W. B. 1C Dublin
Storey, T..... 2C N.Shields
Thompson, E.A. 2C London
Watson, Joseph 2C Liverpool
Wilkie, Jas. B. 2C "
Young, P. .... 1C N.Shields

On May 25th, the *Griffon*, torpedo-boat destroyer, built by Messrs. Laird Brothers, Birkenhead, went out for her official full-power coal consumption trial, with very satisfactory results, her speed on the mile being 30·03 knots, and for the three hours 30·02 knots.

Natal and the Cape.—The Natal Government is negotiating for a direct line of steamers from the Cape to Durban.

The Marine Engineer.

LONDON, JULY 1, 1897.

THE Institute of Marine Engineers is flourishing beyond all anticipations. It has just signalised its seventh anniversary in the usual way amongst Englishmen, by a banquet, at which the President of the Institute (J. Fortescue Flannery, Esq., M.P.) occupied the chair, and was supported by a large and exceptionally distinguished company, which included representatives of no less than six foreign navies. The principal guests of the evening were the right Hon. C. T. Ritchie, President of the Board of Trade, andthe Hon. R. J. Seddon, Premier of New Zealand; as representing the Admiralty and the Royal Navy, there were present Mr. C. Ellison Macartney, M.P., Sir Wm.H.White, and Mr. A.J. Durston,K.C.B., R.N., with many supporters from amongst the fleet—and chief engineers of the R.N. and R.N.R.; and the Board of Trade and cognate institutes were represented by their presidents and officials. After the usual loyal toasts the President, in giving the Navy, Army, and Reserved Forces, remarked upon the great attention and money that was being expended at present and for some years back, upon providing an adequate navy for the defence of the widespread and imperial interests of this country, and particularly complimented the self-sacrificing members of the Institute, who gave up their leisure for the purpose of training themselves in the bearing of arms for the service of their country in the Naval Reserve—a gratuitous training with very inadequate recognition by the State. He believed that the opportunities of training already offered, especially to the engineers of the Naval Reserve, would soon be extended to the privilege of going to sea in Her Majesty's ships to make themselves thoroughly acquainted with the duties that would devolve upon them in time of battle. Mr. G. W. Macartney, in response, was able to state that the present proposals for greater opportunities for practical experience for the members of the Engineer Naval Reserve were merely tentative to see how far the engineers would avail themselves of such or further opportunities, and that the matter was receiving the greatest attention from the Government. Mr. Manuel also, in reply, assumed that sea-going experience in the Navy was shortly about to be afforded to the engineers of the R.N., and felt sure that they would maintain their credit under such circumstances, and find agreeable and instructive association with the officers and men of the Navy. Sir William White, in proposing the Houses of Parliament, lauded the constitutional principle of Parliamentary government, and pointed out the large and increasing proportion of shipowners, shipbuilders and ship engineers, who now formed so active a portion of the legislative body. Mr. Ritchie, in response stated that he always looked back with pleasure to the time when he was Secretary to the Admiralty, and considered that it was a point of congratulation to that department that they secured the services for the country of Sir Wm. White. He further congratulated the Institute and the body of marine engineers as to the rapid progress they were making in status, and in scientific ability to keep pace with the increasing complexity of modern marine engineering. Every year the services rendered by this branch of the profession will be more appreciated. In conclusion, as representing the legislature of this country, he welcomed the Premier of New Zealand and thought that Imperial patriotism was growing by leaps and bounds, and would shortly bind the colonies and the mother country in much closer bonds to their mutual advantage. Mr. E. Robertson, in proposing "Ships, Colonies and Commerce," coupled with it the names of Sir Edwyn Dawes (past President), the Premier of New Zealand, and Mr. Alderman Samuel. Sir Edwyn Dawes recalled his early experiences of his voyage to China in the first steamer that ever went to the East, a little screw steamer of only 650 tons, that belonged to the P. & O. Co., which was considered a wonderful achievement in its time, but at the present time probably 10,000 tons of shipping leave Europe for China every day, and 20,000 per day for India. Mr. Seddon, who was received with acclamation, pointed out that the present trade of the British Colonies were as great as the trade of Great Britain and India at the commencement of the Queen's reign and that might give some graphic idea of the importance of our colonial trade. He strongly protested againt any idea growing in this country that any progressive legislation in the Colonies in any way signified a desire for separation from the mother country. Far otherwise, come what might, the Colonies would always be at the side of the mother country. He pointed out that the mother country being a little old-fashioned and conservative might follow with advantage some of the progressive legislation of the Colonies, as for instance, their Shipping and Seamen's Act, in which they had legally defined the status of the marine engineer as an officer with his full privileges. In conclusion, he was the bearer of a special message of good will to the Institute from the marine engineers of New Zealand, and a presentation to the President of the associate badge of the marine engineers of New Zealand, which was accordingly presented to the President. Sir E. J. Reed, in proposing the Institute and their officers, considered the progress of the Institute most remark-

able, and that they might now assume that it had reached a position that could hardly be surpassed when it could assemble at its board such men as he then saw around him. He had personally known the President for many years from his boyhood upwards, and congratulated the Institute upon having both a Parliamentary and marine engineering President combined. Mr. James Adamson (Hon. Sec.), in responding fully confirmed the exceptionally flourishing condition of the Institute, and of its provincial and foreign branches. He particularly welcomed the presence of their brethren of the Royal Navy, and thought that by interchange of courtesies and experiences of machinery and methods, much mutual advantage might be obtained. The visitors were not forgotten by Mr. A. J. Durston, and briefly responded to by the President of the Institution of Mechanical Engineers, as the programme of toasts and music had proved even too lengthy for the time available.

The special Jubilee Conference of the Institution of Civil Engineers has signalised one fact, namely, that the importance of naval construction and marine engineering is now such that a special department or section was given to these subjects. An interesting paper by Mr. Archibald Denny we shall give in our next issue, our space is too limited to give the whole of the papers of interest to our readers in a particular section. The Hon. Parsons gave further particulars of his most successful torpedo boat the *Turbinia*, which promises to make an epoch in marine propulsion at high speeds. We have before noticed this little vessel and her engines, and now have an opportunity of presenting our readers with full details and diagrams of the *Turbinia* and her engines. Mr. A. E. Seaton is well known as an authority on water-tube boilers, and his paper on this subject was listened to and debated upon with great interest, as adapted to the Mercantile Marine. As Mr. Seaton points out, the present interest in the boiler represents a resurrection and a revival, and the large success attained in the Navy naturally raises the question as to its prompt adaptation to the Mercantile Marine. The Americans for some years have been paying more attention than ourselves to the potentialities of this class of boiler, but there is still much ground to investigate. The shipping of the Mercantile Marine may be divided into—(1) passenger steamers pure and simple, (2) cargo steamers carrying passengers, and (3) cargo steamers pure and simple. The passenger steamer must necessarily be a fast one, and as deadweight should be reduced to a minimum, this class of steamer would seem to be that which the greatest advantage could be gained by water-tube boilers. Large numbers of passenger steamers run on short service of a few hours at a time, where steam is constantly being raised, and here again the greatest advantage from quick steaming water-tube boilers would be found. In the cargo boat proper, or in the mixed cargo and passenger steamer, the advantages of the water-tube boiler are not so apparent. There are not lacking signs that the final adoption of the water-tube boiler in the Mercantile Marine will be preceded by the use of a combination of a water-tube and tank boiler, which may be preferable in the Mercantile Marine, as they would not become dry so soon from a temporary cessation of feed. Upon the question of any desirability of change, it may be remarked that there is an unmistakable desire for higher steam pressures, even amongst "tramps." Even now 250 lbs. per square inch is spoken of as desirable. This pressure would fearfully increase the thickness of plates and rivets in Scotch boilers, and flues would always be liable to collapse. Water-tube boilers with tubes of no greater thickness than ¼ in. would be amply suitable for such high pressures. The tenor of the discussion was generally that the water-tube boilers had at least to have now a trial in the Mercantile Marine.

Nickel steel and aluminium seem to be the coming materials for lighter scantlings, as regards the specific weight of material, for improvements in shipbuilding design. At least, Professor Biles presented these materials in a most favourable light to the engineering conference. Nickel steel has been adopted by the Admiralty for torpedo-boat destroyers. This has a tensile strength of 37 to 40 tons. The adoption of some quality of nickel steel for larger vessels is likely to follow. It is, however, at present, three times the price of mild steel, which must be somewhat of a bar to its general use. It has great qualities in resistance to corrosion, upon which point Mr. Beardmore is an authority, who gives a gain of 21 per cent. in favour of nickel steel, whilst Mr. Riley states the corrosion of nickel steel with 3 to 5 per cent. of nickel to be only half that of carbon steel. This property would probably lead to safe reductions in scantling. To obtain reduction of specific weight it would seem to be necessary to employ aluminium. It seems doubtful whether any alloy of this metal has yet been commercially introduced which will resist the action of sea water, but we have heard from private sources that this can be done, and will probably shortly be introduced. At the same time there are many parts of the hull which are not much exposed to corrosion from sea-water, and in these parts aluminium alloy can readily be employed. With double the sections of steel it would be more rigid, and one-third lighter. Prof. Biles gives figures to show that if the

possible reduction of deadweight by the substitution of a better or lighter material be employed in increase of boiler and engine power, the increased cost of the new material would probably not be as much as the necessary increase of cost in a vessel to develop the higher rate of speed with the same passenger accommodation. Mr. West followed with a paper showing the great changes caused by the choice of materials and workmanship on merchant shipping, and considered that as great a stride as occurred between steel and iron may still be effected by a change from carbon steel to another form of steel.

LARGE DOUBLE-HEADED MILLING MACHINE.

OUR American cousins have taught us much in the matter of machine tools, and we think it will be generally conceded that the introduction and development of the milling machine is largely if not entirely due to our *confrères* on the other side of the Atlantic.

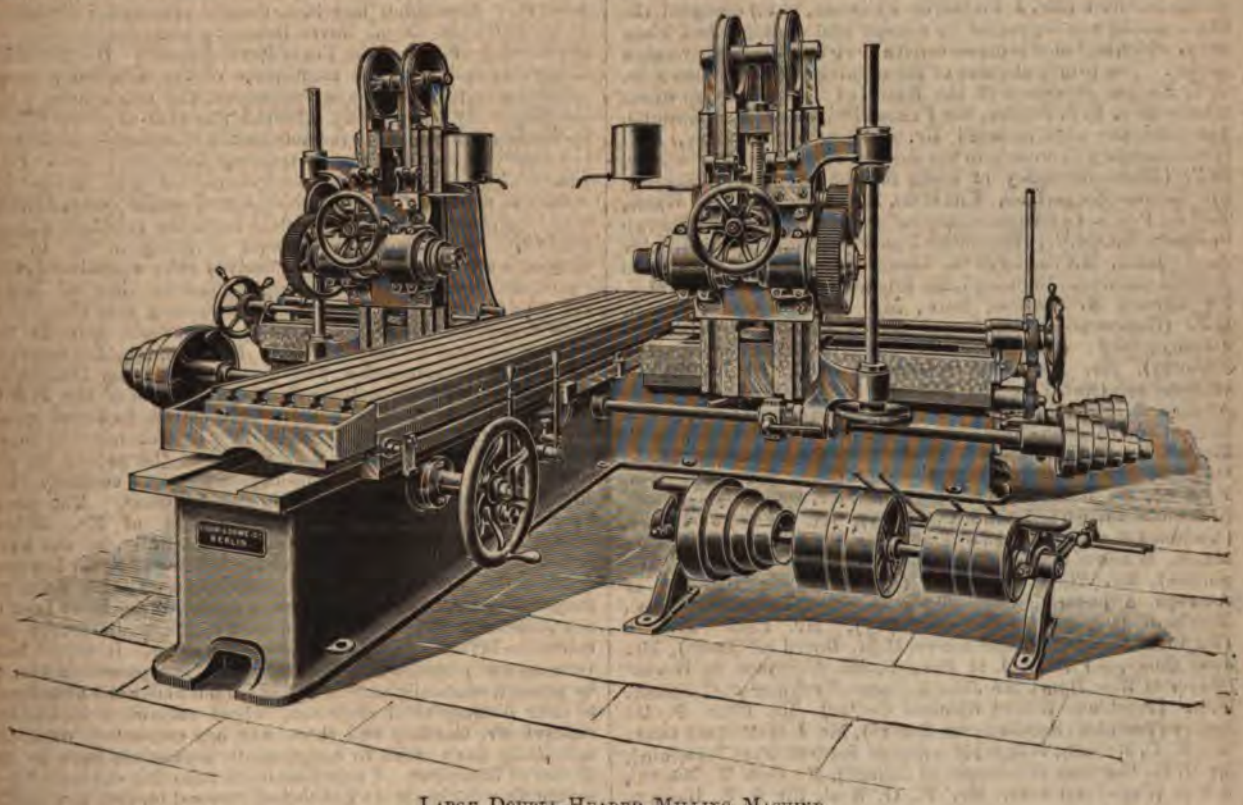
However, we have evidence of this class of machinery being pushed by other countries, and we illustrate in the adjoining diagram a large double-headed milling machine, which has been designed and is being manufactured by Messrs. Ludw. Loewe & Co., of Berlin.

This machine is designed to meet the demands of modern mill-machine practice, for taking broad cuts at a fast feed.

Both milling heads are driven from a horizontal shaft, which carries a four-step cone pulley. The heads are connected with this shaft by clutches so that they can be driven independently or both at the same time. By this arrangement, when taking heavy cuts, the cutter arbor can be driven from both ends.

The spindles are driven through bevel and spur gear wheels in proportion of 20 to 1. They are hollow their entire length, and are 5½ in. diameter. They have extra long cylindrical bearing, and are hardened and ground, running in bronze bushes with adjustment provided for taking up the wear.

For adjusting the heads to an exact height the uprights on each side are provided with scales graduated to 1/10 mm. Both heads are counterbalanced, and can be firmly clamped to the heavy uprights by means of bolts engaging in T slots. They can be moved independently or together in a vertical direction. In the former case they are moved through the large hand wheel seen near the centre of the head,



LARGE DOUBLE-HEADED MILLING MACHINE.

just over the spindle. In the latter case they are moved by hand wheels, one at each end of the large cross bed, the shafts of which are connected by gearing and which work the vertical adjusting screw through spiral gears.

The uprights are adjusted by horizontal screws which are worked by levers shown at the end of the cross bed. They are clamped by bolts engaging in T slots in the bed.

The working table is especially heavy and provided

with five T slots for clamping the work, and receptacles for oil and chips at either end. It is fed by a worm which works directly into the underside of a rack running the entire length of the bed. For taking up the back lash this worm is made in two parts, one of which is adjustable. The end thrust of the table is taken on ball bearings. The feed is automatic in either direction and has an automatic stop motion. It can be fed by hand through the large hand wheel shown at the side. The feed and the reverse motion is operated through the levers shown near the hand wheel. The machine takes a roughing cut, with a feed of 6 in. per minute.

The table can be fed by 48 different feeds.

The London representative of Messrs. Ludw. Loewe & Co. is Mr. H. F. L. Orcutt, of 145, Cannon Street, London, E.C.

INSTITUTE OF MARINE ENGINEERS.

THE seventh annual dinner of the Institute of Marine Engineers was held on Wednesday evening, June 2nd, in the King's Hall at the Holborn Restaurant, when the President of the Institute (Mr. J. Fortescue Flannery, M.P.) occupied the chair, and he was supported by a large and distinguished company, which included representatives of no fewer than six foreign navies. The principal guest of the evening was the Right Hon. C. T. Ritchie, President of the Board of Trade, next to whom sat the Hon. R. J. Seddon, the Prime Minister of New Zealand. The company also included Mr. C. Ellison Macartney, M.P. (Parliamentary Secretary to the Admiralty), Mr. Jesse Collings, M.P. (Under-Secretary of State for the Home Department), Sir Thomas Sutherland, K.C.M.G., M.P., Sir Wm. H. White, K.C.B., F.R.S. (Assistant Comptroller Royal Navy), Sir Edwyn S. Dawes, K.C.M.G.; (Immediate Past President, Inst. M.E.), Sir E. J. Reed, K.C.B., F.R.S., Lieut. Colwell, U.S.N. (Naval Attaché American Embassy), Mr. Edmund Robertson, Q.C., M.P. Sir Edward H. Carbutt, Bart., Mr. A. J. Durston, K.C.B. R.N. (Engineer-in-Chief Royal Navy), Commander L. von Sztranyavszky (Naval Attaché Imperial Austro-Hungarian Embassy), Mr. Alderman Marcus Samuel, J.P., Capt. J. Grigorovitch (Naval Attaché Imperial Russian Embassy), Rear-Admiral E. Richard (Naval Attaché French Embassy), Capt. A. J. G. Chalmers (Nautical Adviser to the Board of Trade), Mr. Benjamin Martell, Mr. J. T. Milton, Sir Benjamin Stone, M.P., Mr. W. T. Doxford, M.P., Mr. W. R. Bousfield, Q.C., M.P., Mr. Wm. Petersen, Mr. W. Lund, Mr. Stuart Hall, Mr. Duncan Mackinnon (Chairman British India S.S. Company), Mr. Walter J. Howell (Assistant-Secretary Board of Trade), Mr. Thos. Richardson, M.P., Mr. E. Windsor Richards (President Institute Mechanical Engineers), Mr. Thos. S. Cookes (Past President Institute of Average Adjusters), Capt. Tomioka, Capt. Yendo and Capt. Miyabara (Imperial Japanese Navy), Mr. Peter Samson (Engineer-in-Chief, Consultative Dept. Board of Trade), Mr. John Corry, J.P., Mr. J. H. Cornish, Mr. Alderman A. Govier (Mayor of West Ham), Mr. John Boraston, Professor A. C. Elliott, D.Sc. (President Bristol Channel Centre), Mr. Chas. S. Du Sautoy (President Southampton Centre), Mr. J. McFarlane Gray, Mr. W. C. Roberts, R.N.R., Mr. Asplan Beldam (Past President), Mr. J. H. Thomson (Chairman of Council), Mr. Geo. W. Manuel, R.N.R. (Past President), Mr. W. G. Neal, Sir A. S. Haslam, Mr. A. W. Robertson, Capt. Coundon, Capt. Ions, Fleet-Engineer C. North, R.N., Fleet-Engineer J. Nicholson, R.N., Chief Engineer Henry Teed, R.N., Mr. J. T. Smith, Mr. J. B. Johnston, Mr. A. G. Crichton, Mr. J. Bigmore, Mr. F. W. Shorey, Mr. William I. Taylor, Mr. S. C. Sage, Mr. T. F. Aukland, Mr. F. Cooper, Mr. James Adamson (Hon. Sec.), and many others.

After dinner the customary loyal toasts were given from the chair, and honoured with enthusiasm.

The President then proposed "The Navy, Army, and Reserve Forces," and said that in this toast was concentrated the patriotism of the English people. At no time in the history of the country had there been more attention attracted to the affairs of our navy—except, perhaps, at the time of Trafalgar—than at the present moment. Thirty years ago the scientific era in naval construction was inaugurated by one who was the honoured guest of the institution that evening, his late master and now his valued friend, Sir Edward Reed, and the principles enunciated then had continued, increasing the power and perfection of form of practical construction ever since. In 1888 the Naval Defence Act added to the fleet 70 ships, every one of them designed by a past president of this institution, Sir William White, and every one of them shaped and proportioned to hold her appointed place in a carefully-devised scheme in the order of battle, of naval tactics and strategical plan for the defence of the whole Empire. We had been adding to that fleet ever since, and in the current financial year we had under construction no less than 107 vessels, with a total displacement of about 380,000 tons. Our Navy Estimates for all purposes were nearly twenty-two millions of money for the current financial year. One pleasing feature, which was not always noticed in connection with this toast, was the international courtesies of friendship, which bind together shipping men and men of science from all the nations of the world. That evening, at their humble board, the Institute of Marine Engineers was honoured with the presence of no fewer than six representatives of foreign navies. In connection with this toast they also thought of the Reserves, and he could not find words to express his humble appreciation of the men who sacrificed their leisure for the purpose of training themselves in the bearing of arms for the service of their country—a gratuitous training, with a very inadequate recognition by the State. This remark applied not only to Volunteers on land, but also to the officers and men of the Royal Naval Reserve. Something had been done to remove the disabilities under which the Royal Naval Reserve laboured, especially the engineering officers of the Royal Naval Reserve. His friend Mr. Macartney had been the mouthpiece of the Admiralty in announcing certain reforms in Parliament, and one reform which the Admiralty had recently initiated was that engineer officers in the Royal Naval Reserve—mercantile engineers—should have the opportunity in future of training themselves for warship practice by attendance at the dockyards. A step further forward was necessary, and that he believed would come, namely, that engineer reserve officers should have the privilege already possessed by other reserve officers of going to sea in her Majesty's ships and making themselves fully acquainted with the duties that would devolve upon them in time of battle. He could assure his friend Mr. Macartney that there were men connected with this institution who would help in the good work that he had started. Mr. Durston, Engineer-in-Chief of the Navy, and a past president of this institution, would help; Mr. Manuel, the Engineer-in-Chief of the P. & O. Co., would help; this institution and all its members would help, and when his friend beside him reached that state of happy domestic felicity to which they saw from the papers he was hastening, none would wish him happiness more cordially than his friends of the Institute of Marine Engineers. The president coupled with the toast the names of Mr. Ellison Macartney, M.P., the Secretary of the Admiralty, for the Navy and Army, and Mr. G. W. Manuel for the Royal Naval Reserve.

Mr. G. W. Macartney, M.P., in response, said: My principal duty to-night is to express the great regret of the First Lord of the Admiralty that it was not in his power to accept the courteous invitation you had extended to him. It would have been a great pleasure to him if his health had permitted him to be present, especially as this dinner is held under the presidency of your distinguished chairman, whose valuable criticism and support Mr. Goschen and those who are connected with the Admiralty have often to congratulate themselves upon in the House of Commons. I would desire to take this opportunity of saying how anxiously we had looked forward to, and how gladly we took, the opportunity in this session of making some suggestions, which have been accepted by Parliament, for affording to the engineer officers of the Royal Naval Reserve the opportunity which has hitherto been denied them of making themselves more closely acquainted with the duties which they have to perform on board Her Majesty's ships. These proposals which were laid before Parliament are of a tentative character, but when I use that adjective I do not for one moment mean to imply that those who are responsible for these proposals, have made them with any hesitation as to the results which they hope will flow from them. But we considered that it would be desirable in the first instance to find out how far the officers of the Royal Naval Reserve would be able to avail themselves of these proposals, or how far we

might calculate upon their being able to avail themselves of more extended proposals in the future. I had by the courtesy of the secretary of this Institute, an opportunity of reading with careful attention that interesting debate which took place last year on the position of the engineer officers of the Royal Naval Reserve in relation to her Majesty's Navy; and if I say that there appeared to me to be a considerable divergence of opinion amongst speakers on that occasion as to what might be the most necessary and most useful steps that could be taken I do not in any way make that observation in a critical or reproachful spirit, for it is perfectly natural that in a great service like this, and having regard to the other important duties which the officers of the Royal Naval Reserve have to carry out, that the difficulties that have to be solved should be many, and such as cannot always be looked at in the same light by every naval officer. But what the Board of Admiralty believe they have done is to afford a stepping-stone and an opportunity to those who desire to carry further their energy in regard to their services in the Royal Navy; and if we are encouraged by the results which flow from the proposals that have now been made, I have no doubt that more extended proposals will be made in the future to enable every officer of the Royal Naval Reserve to carry out that ambition which so many have expressed themselves desirous of exhibiting, and obtaining a closer and more perfect knowledge of those important duties which fall upon all engineer officers of the Royal Navy. It would be unbecoming of me if I did not recognize the very great services which in regard to this question have been performed by one of your vice-presidents, Mr. Durston, who has taken the deepest interest in this subject, and has offered to the First Lord of the Admiralty and his colleagues every possible information which his experience could suggest. I can only say on behalf of those who are now responsible for the administration of her Majesty's Navy, who are so closely connected with the members of the Institute by the relation which so many of them hold to the Board of Admiralty as officers of the Royal Naval Reserve, that from the very moment we took office we have had our attention directed to this particular question, and that if there has been some delay in making these proposals it has been only because we desired to lay what we believed to be practicable proposals before Parliament, and that we shall lose no opportunity which may flow from the results of these proposals of increasing the efficiency and taking advantage of the zeal of the engineer-officers of the Royal Naval Reserve.

Mr. Manuel said: Mr. President and Gentlemen,—On behalf of the officers and men of the Royal Naval Reserve I thank you for the hearty manner in which you have received this toast, and I also thank the President, Mr. Macartney, M.P., the Parliamentary Secretary of the Admiralty, and other members, on behalf of the engineer officers of the reserve, for their endeavours to obtain for engineers an opportunity of becoming more acquainted with, and so more efficient for their special duties in Her Majesty's Navy when suddenly called out in time of war. Gentlemen, I need hardly remind you that the officers and men of the reserve are volunteers in every sense, and fully deserve all your interest and that of the British nation, for they fulfil two most important duties to the nation. In their daily labours, and at the risk of their lives, they greatly assist in sustaining the commercial prosperity of Britain and her great Colonies in every part of the world. When war approaches they are ready again to risk their lives and to fight in defending them against their enemies. It is true that their position in war may be the second line of defence, but in peace their position is in the first line—in the maintenance of its commerce by sea. As a number of the members of this Institute are engineer officers of the reserve, and some are here to-night, I congratulate them on the opportunity soon to be afforded them of a short period of training in Her Majesty's Navy, and when the terms have been formulated by the naval authorities I have no doubt but what the shipowners will give them the same facilities for doing so as they have done to the deck officers in respect of their training for the reserve duties. One word to the reserve engineers when serving for training. I trust you will do your utmost to maintain the record you have won in the Mercantile Marine, and I am sure that your associations with your brother officers and men in the Navy will be of an instructive and agreeable character. Gentlemen, I again thank you for the hearty manner in which you have received this toast.

Sir William H. White proposed the toast of the "Houses of Parliament." It had been his fortune, as it had been theirs, no doubt, to hear this toast proposed a great many times, and so far as his own observation went they were accustomed to hear it accompanied by a good many allusions to what the Houses of Parliament had been, and what they might be. They heard of the good old times, or of the times which might be better, and which were yet to come. He was going to propose to them that evening the Houses of Parliament as they were, and he felt sure that in giving it in that sense it would receive a very hearty welcome. In that assembly he presumed that they might speak of the Houses of Parliament more or less as the propelling machinery of the ship of State. If they might trust to history the ship of State did not originally have this form of propulsion, but long ago it was discovered that the Anglo-Saxon race required some relief in the form of speech. Matters had been going on in that way now for some centuries, and he supposed they must all agree that on the whole they had been going very satisfactorily. No doubt there had been great need for change. The machine was an old one, and it had had to undergo many modifications in order to meet the new conditions of the State and the ever-increasing responsibilities, but so far it had never failed to work. They did not believe it was ever going to fail to work. So long as there were to be found men prepared to give their services to the State in both Houses from patriotic motives, and from a desire to assist the Government of this great Empire, so long this machine must work with a will, and the Empire would be the better for it. They did not forget that there had been times when proposals had been made to pluck out part of this machine and to start afresh. That experiment had been tried in other countries, and he was not aware that it had always been attended with complete success. He thought that this country would be content to go on in the way to which it had become accustomed. Sometimes the rate of progress might be slow, but on other occasions he had sat below the gallery and had the pleasure of seeing votes for four millions passed in five minutes. This was undoubtedly forced draught. To follow out the engineering simile, it was a good thing sometimes to have a governing arrangement in the upper chamber. Nor must they forget that evening, when they had the honour of the presence of the Prime Minister of New Zealand—that this great ship of State which the Houses of Parliament propelled had associated with it other smaller and younger members of the great flotilla which went to make up the British Empire. One feature of the House of Commons there was which they must all view with satisfaction. He could remember the time when there were very few shipbuilders or ship-engineers who were members of the House of Commons. He remembered the time when Sir Edward Reed made his first appearance in the House, not as a member, but at the Bar. Sir Edward had afterwards crossed the bar, and he (Sir Wm. White) was quite sure that they all hoped he might once again become a member of the House of Commons. Things had improved. Shipowners, shipbuilders, and ship engineers, were now singularly well represented there, and he was sure he expressed the feeling of the institute when he said that they were all delighted that their president had won his way into the legislative assembly. He had to associate with the toast two names. One was that of the Right Hon. Chas. T. Ritchie. He first became associated with Mr. Ritchie when he was Secretary to the Admiralty, now nearly twelve years ago, and he had to thank him in great measure for the fact that he (Sir W. White) was invited to go back to the Admiralty and to take up his present post. He spoke from knowledge when he said that from the date when Mr. Ritchie first assumed responsible office he had continued to make his way as a public servant, going on from strength to strength, until some of his admirers were quite confirmed in the belief that the Board of Trade, over which he so ably presided, ought to be presided over by a Secretary of State. Therefore they hoped that if Mr. Ritchie continued in his present office, and was not promoted to a higher post, he would become the Secretary of State for Trade. He also wished to associate with the toast the name of the Right Hon. Jesse Collings, M.P.

Mr. Ritchie, in response, said: The toast has an added value for myself in that it has been proposed by my friend, Sir William White. I have always looked back to the time when I was Secretary to the Admiralty as one of the most pleasant periods of my public life. At that time the First Lord of the Admiralty (Lord George Hamilton) and myself had to consider the question of many reforms and of some alterations, and while I think we are justified in congratulating ourselves upon the success of the changes which we made at that time, there is nothing upon which we can congratulate ourselves and the country more than

having secured the services of Sir William White, who has not only added lustre to the position he has occupied, but has performed a public service to the country which I don't believe the country yet realises—but which those who know the work he has done appreciate. They know that for much—for most—of the satisfactory position in which the navy at present stands we owe thanks to Sir William White—a man who would have made a distinguished position for himself wherever he had taken his services, but who was content to devote those services to the public interest, and sacrifice, I fear, all his own private interests. These are men of whom the country may well be proud. Mr. Ritchie went on to contrast the businesslike methods of the present House of Commons as compared with some of its predecessors, observing that no greater illustration of its virtues could be found than in the fact that it not only refused to go to the Derby, but declined even to consider a proposal to that effect. The right hon. gentleman continued: As President of the Board of Trade I have a peculiar and very heavy responsibility with regard to our Mercantile marine, and it is a matter of great satisfaction to me that I have been able to take part in this most interesting gathering. I have the pleasure to congratulate you on the progress which this Institute is making, the progress which is being made by the marine engineers of this country, and the great addition which we are glad to think has been made to their status and position of late years. The marine engineers are, it is true, and must be, mechanics, but they are no longer simple mechanics. They are men of high scientific attainments, rendered necessary by the great development and the increasing complication of the machinery with which they have to deal. That of itself has made the profession infinitely more interesting than it was before. It has attracted to the science year after year larger and larger numbers of the best of our middle-class families, and they, in order to undertake the duties which lie before them, do not hesitate to undergo the hardships which must always be attendant upon apprenticeship to such a profession as this. The Institute has, I am glad to think, done much to secure the increased status of the engineers of our Mercantile Marine. The various technical institutions which have also been established have likewise done much. The Board of Trade, with their examinations both voluntary and compulsory, have also helped towards the increased status of the profession—and I believe, myself, that it has before it, and that this Institute has before it, a very considerable future. Every year, I think, the services performed by this branch of the profession will be more and more appreciated by the general community. I congratulate the profession upon the fact that we have in the House of Commons the president of your Institute. Something has been said about the number of shipbuilders and shipowners in the House of Commons. In my opinion nothing can conduce more to the efficiency of the House of Commons, nothing can give the people more confidence in the House of Commons, than the fact that there are within its precincts men who are able to deal with all the problems connected with our shipping and our various industries, and who are able to instruct the House of Commons, and give it the benefit of the experience they have gained. It is a great pleasure and satisfaction to me to sit next to the Prime Minister of New Zealand. As representing the Legislature here to-night, I give to him a cordial welcome as the representative of the Legislature of New Zealand. As a member of the Government I give him a cordial welcome as the head of the Government of New Zealand. There was a few years ago some talk about the coolness between the mother country and her colonies. I should like to see the man who would stand up now and talk about coolness. So far from that, the feeling of Imperial patriotism is growing by leaps and bounds, and, strong as that feeling is now, my firm conviction is that we are only at the beginning of a great wave of Imperial patriotism which will bind the colonies and the mother country closer and closer together, to the great interest and advantage of both.

Mr. Jesse Collings, M.P., who also responded, observed that it was owing to the contrivances of marine engineers that Mr. Seddon had been able to come thousands of miles to say "How do you do?" to the people of this country. Sir William White had alluded to the fact that both he and the speaker were Devonshire men. In that country they had some great men who had no appliances such as marine engineers furnished now, but who nevertheless went a long way towards the making of England. He wished that the story was told in our schools of the men who made this country great; of our colonists, our explorers, our navigators, and our missionaries, who went forth and through trouble and trial, and even death, made our Empire such as the world had never seen.

Mr. E. Robertson, M.P., in submitting the toast of "Ships, Colonies, and Commerce," said that there were present not only several representatives of the Admiralty, but various naval attachés of foreign Powers whom they were glad to welcome. In these circumstances he was not going to let out any Admiralty secrets—especially when his friend and former mentor, Sir William White, was so near; but perhaps he would be forgiven if he expressed a doubt as to the wisdom of any combination which might challenge the fleet of Great Britain as it was now, and as it would be. The Prime Minister of New Zealand had not come to London to fulfil the prophecy of Macaulay, and to go down to one of the bridges and sketch the ruins of St. Paul's. On the contrary, he came there to see the British people at the acme of prosperity, and glad to welcome him and the representatives of many other colonies. He was reminded by Sir William White that Mr. Seddon had an additional claim upon the sympathy of that audience, because he was himself a practical engineer. He (Mr. Robertson) had pleasure in coupling the respective branches of the toast with the names of Sir Edwyn Dawes, the Prime Minister of New Zealand, and Mr. Alderman Samuel.

Sir Edwyn Dawes, in responding for "Ships," said: When I had the honour of being elected President of this Institute, a year or so ago, I was introduced to you by the previous President, and I remember with very much pleasure the exceedingly kind remarks which he made upon that occasion. That apostolic succession is now weighing upon me. I conceived it my duty to faithfully hand that over to my successor, and until I can divest myself of it I shall not be quite happy. I am bound, therefore, to discharge that duty before I go any further, and to wish for your President all health during his year of office. I only hope it will be as pleasant an office for him as it has been for me. Of this I am quite sure, that he will fill the office with great credit to himself, and with distinction to the Institute. I now pass to the toast. Happily, my words need be very few, because, like all of you here present, I am impatient to give a warm reception to the Prime Minister of New Zealand. At the present time, no matter the subject brought before us, we connect it with the reign of Her Majesty the Queen, and I can conceive nothing more interesting than to take stock of the enormous developments that have taken place in shipping, in the colonies, and in commerce during the Queen's reign. Personally I cannot go back for 60 years, but I have been connected with ships, colonies, and commerce for 43 years, and I will just mention some changes which have taken place in my experience. It was my fortune to go to China in the first steamer that ever went to the East—a steamer belonging to the P. & O. Co., whose chairman is here this evening, and who ought to be replying to this toast, for not only is he chairman of the finest British steamship company, but it is mainly owing to him that that company has risen to its present magnificent dimensions. I went out to China in the first screw steamer that went to the East—a little steamer of only 650 tons. She was a full-rigged ship, and we took 22 days to beat up the China Seas to Hong Kong. At that time there was only a monthly communication with China. At the present time, I venture to say, there are 10,000 tons of shipping leaving Europe for China every day. The only other steamers east of Suez were steamers of the company I have named—old paddle boats running from Aden to Suez, and connecting with Bombay. I am within the mark, I think, when I say that there must be 20,000 tons of shipping now leaving Europe for the Indian ports every day. It is almost impossible to recognize such an extraordinary development in a single lifetime, for I may add that I have not done yet. The progress of our colonies has been quite as great as the progress of our ships, but the progress that pleases me most is the progress which has taken place in the last four or five years. Instead of looking coldly upon our colonies, instead of receiving their advances in a spirit of callousness, we now realize the spirt of brotherhood, and the hand that is stretched out is warmly clasped. Can there be anything more pleasing to us as Englishmen than to see the ties between the mother country and the colonies so closely united as they are at the present? I join with you in giving Mr. Seddon a most hearty welcome.

The Hon. R. J. Seddon also responded, and was received with hearty cheers. There were, he said, occasions when one found words quite inadequate to express one's feelings, and he could assure them that he was quite unable at that moment to properly

thank them for the cordial reception which had been accorded him. He felt, however, that he was among friends. Otherwise possibly he might feel nervous on such an occasion, seeing that it was the first time that he had publicly spoken in his native land for the last 34 years. He had only arrived in their metropolis a few hours before, as a stranger, he was taken to the banqueting chamber. Reference had been made to the colonies, and when he told them that at the commencement of her Majesty's reign the trade of Great Britain and India did not equal the trade of the British colonies at the present time they would see how vast and how great were the interests involved in dealing with those colonies. He had been told that fears were being constantly expressed of the food supplies of this country being curtailed, and that even in London it was feared there would not be sufficient food for the number of persons who would be in the city on the day of the Jubilee celebration. He was only sorry that that information had not been sooner sent to New Zealand and the other colonies. They would have met the difficulty. The colonies could look after the food supplies of the mother country, and the colonists desired to do that. Then as to the feelings of the colonies towards the mother country. He had read with the deepest pain that, because they went in for progressive legislation, or because the colonies were going a little faster than the mother country—that that meant that separation was their goal. Other persons went further, and said that their actions tended towards anarchy. He said that such expressions of opinion were calumnies upon the good people of the colonies. They recognised that they were living under the greatest and the safest constitution that was ever framed. They loved and revered, without fulsome adulation, the head of that constitution, and, come what might, they would be behind them, they would be with them. In the hour of sorrow their hearts would beat in unison, and in rejoicing they would be together. He had heard that night from one of the speakers that the British Parliament was the propeller of the ship of State. He demurred to that doctrine. He contended that the people were the propelling power. Might he say how he classified them? He simply said, comparing the high pressure with what they now had, the triple-expansion, that there had been a waste of fuel. Looking at the progress which had been made, the legislation which was under consideration, and the legislation which he hoped might become law, he said that the mother country was going in the direction in which the colonies had long been going, namely, towards minimizing as far as possible the sufferings of humanity. In New Zealand they had placed upon the Statute Book a measure known as the Shipping and Seamen's Act. They had there said—it was a matter in which he hoped that the Imperial Parliament would not lag behind—that engineers should be classed as officers. The President of the Board of Trade had told them that the status of engineers had been improved of late years. He (Mr. Seddon) said, Let that status be placed upon the Statute Book of this country, and let justice be done to that class who had the lives and the property almost of the nation in their hands. Let justice be done them, and he felt sure that every marine engineer would feel that he must do his duty fearlessly to his country, and must go onward in the march of progress. He might add that not only had New Zealand done this—and he hoped he was not saying a single word that would cause discord, but they had said that whenever any steamer whatever came to their ports the engineers should receive what was fixed and determined as being the current salaries payable in that Colony of New Zealand. That had been brought about in the Act of last session, and they claimed that it had been for the protection of the commerce not only of the colony but of the Empire. That, more than any other reason, had weighed with the colonists. He did not think he should be justified in saying anything further beyond this: He wished them to bear in mind that with the commerce of the country they must inevitably consider the question of defence. The commerce of the colonies with the mother country was increasing, but he wished them to notice that it was also increasing with foreign nations. He was not at all pessimistic, neither were they as a whole in the colonies, but there was at the present time a state of things existing which gave them the greatest concern, and which they believed ought to engage the attention of the Imperial authorities. As a result of the extension of our colonies in Africa and elsewhere, was there a commensurate increase of business with this country? Or did they find the representatives of other enterprising nations, order-books in hand, carrying on the trade which in his opinion should be carried on by the mother country? In conclusion he wished to say that although the marine engineers of New Zealand had not anticipated that such an opportunity would be afforded, they had requested him to present to the President of the Institute of Marine Engineers the associate's badge of the Marine Engineers of New Zealand. Speaking to the president, and to the marine engineers of England there assembled, he conveyed to them the hearty good wishes of the engineers of New Zealand—he might go further and say, of Australasia. He trusted that the good feeling which now existed might ever continue, and should it ever happen that their president visited the colonies he would be received by his brethren in the profession with open arms. When he returned to New Zealand it would be his duty to inform them of the kindness extended to himself, and he felt sure that the marine engineers of New Zealand would find themselves placed under an obligation which would give them some trouble to repay.

Mr. Alderman Marcus Samuel also briefly responded to the toast, and said the continued progress and expansion of our commerce to-day was proof that the spirit which animated our ancestors lived still. So long as that spirit was maintained, so long would our commerce prosper. The Alderman also remarked upon the remarkable development of Japanese commerce.

Sir Edward Reed said that, speaking nationally, he did not think they had been very modest that evening, particularly having regard to the fact that they had so many distinguished foreigners among them. But, speaking from the point of view of the Institute of Marine Engineers, and in proposing success and prosperity to that institution, he should assume an appearance of modesty, even if they did not all feel it. He hardly knew how to propose the toast, because he noticed that his right hon. friend (Mr. Ritchie) had made a very handsome speech with reference to marine engineers and to their institution. He did, however, propose the toast with very great satisfaction for two reasons. In the first place he thought that the work which the Institute carried out was good and excellent work. The progress of the Institute had been most remarkable, and he thought they might now assume that it had reached a position which could hardly be surpassed, when it assembled at its board such men as they had seen at its table that night. It was in the highest degree gratifying to him to know that men so busy and so much engaged in another way, as the Director of Naval Construction, and the head of the Engineering Department of the Admiralty, were willing to take that opportunity of coming among them. The second reason he had for proposing the toast with much satisfaction was that they had in the chair that night a marine engineer of the greatest public distinction, who had worked his way up from boyhood, when he (Sir Edward) first had the pleasure of presenting innumerable prizes to him, when he came up as a student at Liverpool College many years ago; until he occupied his present position, and presided in such a remarkable manner over the Institute of Marine Engineers. Reference had been made to the desirability of having in Parliament men acquainted with technical questions. He must heartily congratulate the Institute upon having not only a Parliamentary president, but a marine engineer president, who was in every way able to do them honour, and win for them additional distinction. He associated with the toast the names of the president, and of the hon. secretary (Mr. James Adamson), and he was sure it would be received with great approval, and passed with acclamation.

The Hon. R. J. Seddon asked at this stage to be allowed to present to the President the associate's badge that had been forwarded for his acceptance by the marine engineers of New Zealand. The badge, he said, was made of New Zealand gold, and bore an inscription indicating the occasion of its presentation. He (Mr. Seddon) trusted that their distinguished President would be blessed with long life to wear the badge on many occasions like the present, and that it would serve to remind him of kindly feelings across the sea.

The President said this was an item that was not included in the programme, and he was quite unable to respond as he would desire to what had fallen from the Prime Minister of New Zealand. He would, however, say, on behalf of the Institute of Marine Engineers, that the feelings of brotherhood towards their kith and kin beyond the seas would be promoted, fostered and intensified by an act such as that which had just been so generously and so gracefully performed.

Mr. James Adamson (the honorary secretary), in responding

to the toast proposed by Sir Edward Reed, said: Mr. President and Gentlemen,—In thanking you on behalf of the office-bearers and council for the kind expressions with which you have greeted this toast, with becoming deference to the noble toasts which have preceded and those which follow the toast of the evening, I am reminded of the recipient of a flattering gift awarded by an Emperor of classic times to him for State services, who pleaded that the gift was too great for him to receive; but, replied the Emperor, it is not too great for me to bestow. So does your indulgent praise this evening meet our modest acceptance, as I venture to think that this combination has met, and may such a condition ever be our fortunate heirloom. And now the auspicious night has come on which we have gathered to celebrate our advancing footsteps, and as a not unimportant factor in the Empire we see in our progress onward the onward progress of the nation, a fuller development of the national faculty which tends to progress. It has been said that war has the effect of kindling into active life the nobler aspiration of our humanity, and while we may agree with and enjoy the arguments of the lecturer, surely the celebration of such an event as that which is drawing the emissaries of peace and goodwill from the far ends of the earth should be the means of stirring into life the active principles before which sordidness pales and envy hides its diminished head. Such associations as ours, having for their object and aim the advancement of special science and its exponents, may be got to run into a groove of ever-narrowing channel by reason of elements at work in the composition of the genus *homo*. We are happy to-night, as we have been on other similar occasions, in being reminded that the narrow view of life becomes not those who seek to lead the way to nobler things, who look not alone on their own work, but also on that of others for the mutual advantage of all. We are fortunate in having present with us to-night those who have helped to make our colonies what they are, working from the centre outward as well as at and from the circumference inward; and the presence of the Premier of New Zealand at our board, and the message he brings remind us forcibly of our kinsmen by blood beyond the seas and our brethren in arms, and we doubt not the return message will be conveyed with pleasure by the ambassador we welcome here to-night. We have an earnest of that in the kind reception accorded to us when we had the honour of waiting on Mr. Seddon on his arrival in London. Our centres in Cardiff and Southampton are established and alive. They are represented with us now by their respective presidents, who will kindly convey to the centres the wishes expressed to-night, for they are included in the toast, as in wishing prosperity to the whole the prosperity of the parts is implied. The centres of life in Calcutta and Bombay should not be forgotten, and we send hearty greetings to all, remembering in our toast absent friends. To Japan, especially after the most interesting paper read the other day on the rise and progress of its people, and my own warm recollections of it fully 20 years ago, we look for the hope of a closer bond with ourselves, and possibly the opening of a centre in Yokohama, or even in Tokio itself, where the Imperial College of Engineering flourishes. Technical education is a subject full to the brim of controversy, and I only introduce it now to plead that the educational department of our work should be helped and encouraged. The annual report will serve to show what has been done during the past session; the prospects of the coming one should soon be reduced to a definite shape by the arrangement of lectures and lecturers' classes and teachers, backed by that which keeps all material and mundane things together. The ways of legislation are devious and strange; there are many windings and turnings to reach the end, but we hope that ere the summer has ended and the storms of winter are upon us that we shall see carried into effect recommendations which we have placed on record for the good of all concerned. The wisdom of the recommendations become more manifest every day. We welcome the presence of our brethren in the Royal Navy, and by the interchange of courtesies more frequently than has hitherto been the case, and by a comparison of our experiences of machinery and methods, we hope to derive much and great advantage mutually; and in connection with this remark Sir A. B. Forwood's article in the *Contemporary Review* is full of suggestion. In closing, I again thank you. Our desire is to carry on the work of the Institute of Marine Engineers in full recognition of the duties and obligations of life, viewed from the highest point of vantage, not from the narrow valley of dry bones. Should we commend ourselves to you as discharging our responsibilities with credit to ourselves and you, we shall be satisfied with your endorsement at our next annual dinner.

Mr. A. J. Durston proposed "The Visitors and Kindred Institutions," and said he only wished he had the power of speech to express, on behalf of the members of the Institute, how thoroughly they welcomed their visitors, and thanked them for their kindly interest in the proceedings, and how much they felt indebted to the representatives of kindred institutions for the help they had given and were still giving the Institute of Marine Engineers. This was a period in which each class or section of the community took more interest in, and had more sympathy with, every other section than was formerly the case, and they had evidence of that on the present occasion, in the presence of distinguished foreign officers, and of politicians both in and out of office and of all shades of political opinion. Kindred societies were also represented by their president and past presidents—men of the highest positions in their respective professions. This present year had brought many of our colonial brethren to these shores and they welcomed in a special degree the Hon. Mr. Seddon, the Prime Minister of New Zealand, who, he understood was a member of the Institute of Marine Engineers in his colony, and who had shown such interest in his profession that he had passed through the New Zealand Parliament a Bill of great importance to marine engineers. It was an instance of that "girdling of the world" in the bonds of commerce and peace in which marine engineers were playing, and were destined to play, so important a part, if only they progressed with the requirements of the times. He coupled with the toast the name of Mr. Windsor Richards, President of the Institution of Mechanical Engineers.

Mr. Windsor Richards briefly acknowledged the toast, and the proceedings terminated.

During dinner a selection of music was performed by the Imperial Blue Hungarian Band, and in the intervals of the speeches several songs, &c., were pleasingly rendered by Mr. Franklin Clive, Miss Lydia Care, Madame Isabel George, and Mr. Herbert Emlyn. Mr. William I. Taylor was the convener of the committee that had charge of the arrangements, which proved adequate and satisfactory in every respect.

THE HANCOCK INSPIRATORS.

THE Hancock Inspirator Co., of Old Swan Wharf, Upper Thames Street, London, E.C., first introduced their inspirators on the market in 1877, and during the last 20 years we understand they have sold more than 200,000 of these devices. They have just brought out an improvement in the apparatus which we have pleasure in bringing to the notice of our readers. In the adjoining illustration, Fig. 1 shows the latest improved pattern of vertical inspirator, Fig. 2 a similar device of the horizontal pattern, and Fig. 3 shows a Hancock ejector or jet pump.

These inspirators are designed to work water at any temperature up to 140 deg. Fahrenheit, with steam pressures of from 25 lbs. to 200 lbs., and higher. It is claimed that they will start readily when both the inspirators and suction pipes are hot, and will either lift the water or take it under a head. Their construction is very simple, and all the parts can be removed without disconnecting them from the pipes.

The special new feature is a regulating valve which is situated directly under the lever, and by means of which the steam pressure in the lifter chamber only is reduced, and enabling the feed to be regulated from the maximum to the minimum capacity without altering the lever, and without the use of a lazy cock or regulating valve in the suction. This arrangement does not disturb the suction by creating a vacuum in the pipe (as is the case when the water supply is throttled), or impair the effectiveness of the forcer.

It is maintained that these inspirators do not "lime up" from bad water, and therefore do not require cleaning very often as is the case with many similar devices.

FIG. 1.

The Hancock ejector shown in Fig. 3 is a compact, simple device for emptying chambers, tanks, or the like, and particularly for the removal of bilge water from the holds of small vessels.

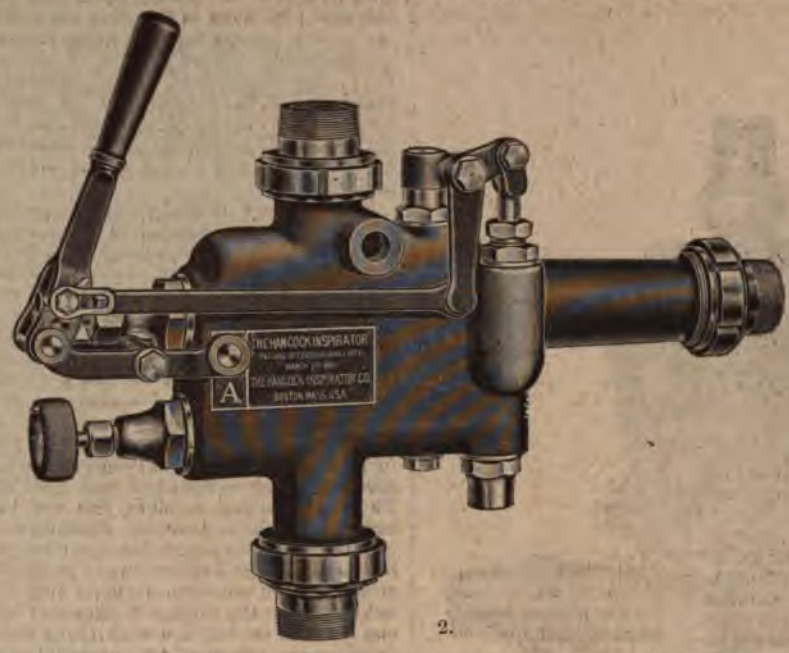
YACHTING AND FISHERY EXHIBITION.

THE above exhibition was recently opened at the Imperial Institute, South Kensington, by the Prince of Wales with some ceremony, and a goodly attendance on the first day to greet His Royal Highness attests to the interest exhibitions of this class always have to a maritime nation like our own. Situated centrally and located in a home that sets off whatever is contained therein with no small advantage, we may be fairly sure that the *eclat* with which it was ushered in will be well maintained. Besides the solid merits of the exhibits more particularly pertaining to marine engineering, and which we propose to pass in review, there is naturally much that, though of value to the sailor and the general public, does not so closely concern the bulk of our readers. While we, therefore, are unable even to mention much that is found from first-class people in their several departments, we shall take an early opportunity of giving fuller details of what we are now compelled merely to touch upon generally.

The North Gallery contains the bulk of what is shown, and there are annexes in addition, in which are to be seen in one the section applying to fisheries and its appurtenances. In the grounds there is a cylindrical tank, in which diving operations are carried on. This is supplied by Messrs. Siebe, Gorman & Co., Westminster Bridge Road, and as this exhibit is near the main entrance it is what takes the sightseer's first attention. Windows are provided for making an underwater inspection, and there is a spiral staircase to enable the visitor to ascend to the surface to a staging from which the descent is made by the diver, and where the pumping apparatus is found for supplying him with air. From this elevated position the man is seen to emerge from time to time in the manner so familiar to those acquainted with the work; but even in this tank the same care is wanted that we know is always requisite where explorations of ocean depths are concerned. Other portions of the grounds are devoted to fairy lamp decorations, both electric and oil, and with the band-stand erected, but scarcely yet occupied owing to the weather conditions, it may be expected that as the summer advances, a little scientific knowledge will be absorbed with a large dose of entertainment, the quality of the music being all that may be desired.

Turning more particularly to the serious part of what is to be seen and endeavouring to eliminate the purely retail part, if we may so describe the many articles found coming under the heading generally known as ship chandlery, we then find ourselves left with a certain amount of representative exhibits. There is the lighthouse model of the south coast, in which the towers are illuminated by tiny electric lights, and where the land is shown in relief from the Bristol Channel to the Thames, while the lights extend from the Scilly Islands to the Nore. The suggestion for this was undoubtedly a good one, and is carried out by the Trinity House in the best manner possible. The work of this body during the past sixty years is also represented by maps, which show the progress made, and where our coasts are now protected compared with what was the case formerly. The most striking model in this way is, however, that of the course of the River Thames. Starting with its rise in the hilly country about the Cotswolds, the river and its tributaries may be traced through London down to its mouth, and a good, wide area on each side is also seen, the main lines of railway being mapped out as well as the various bridges over the river. The work is one that, in conjunction with that already mentioned, attracts considerable attention, and certainly merits it, because in no other way can a really adequate idea be obtained of a river basin. A smaller and less obtrusive display of the kind is a projection of the world, the water being made to flow in the form of currents, according to the prevailing streams found in the several localities. By means of a powder distributed in the water the direction the currents take is clearly seen, and we noticed our own particular gulf stream was well to the front, distributing its warmth along our shores, and so on to Norway and the Pole. The Trinity House has a large exhibit altogether, ranging from a model of its yacht *Irene*, to that of its principal lighthouses, and the apparatus used therein, like lanterns, reflectors, &c. This gives an official tone to the exhibition and Lowestoft and Plymouth as towns, help in this laudable way also. The room already mentioned is nearly filled by what these two districts show, as representing the East and West coast fishing industries respectively. Here are found the models of trawlers, and the gear used, and the nets being spun on a machine for the purpose, worked by foot-gear. There is no machinery in motion at all, though for certain exhibits steam is laid on. What engineering there is, and there are some good specimens, may be examined; but no test can be made in working, except by manual power. The Liquid Fuel Engineering Co., of Abchurch Lane, have two good launches driven on their principle. The boiler is a water-tube, one of a neat design, and the fuel is sprayed in before consumption. The several engines this firm puts forward are compound, and catering as they do for yacht owners, many of their style of stockless anchors are shown also. The Maxim-Nordenfeldt Gun Co. have three of their guns on view, two of the automatic type, and one quick-firer semi-automatic. All these are mounted on naval cone mountings of the usual pattern. Messrs. Priestman have a double-acting 40 H.P. oil engine in the North Gallery. This machine looks a very serviceable one for its work, though a trifle heavy. As the engine, however, requires no boiler, we may scarcely expect it to compare, weight for weight, with its ordinary steam competitor. In steering gears, Messrs. Davis & Co. are to the fore with one of their small machines, and Messrs. Hall & Co., Dartford, are representative of refrigerating machinery. This last firm have good models, showing the hold of a ship partitioned off and properly insulated for carrying different cargoes by the same installation. For instance, we see mutton in one chamber, fruit in another, and a wine store next to it. In steam capstans for trawling work, Messrs. Elliott & Garrod, of Beccles, are well to the front with several handy machines of this class, and the vertical boilers that furnish the steam supply for them

Messrs. Heinke & Co. show their new four-cylinder pumps, which by the movement of a lever, throw off half the work and do away with the labour of one man. Other specialities of this firm are their patent boots for under-water work and the speaking apparatus,



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by which whatever the pressure due to depth, communication may always be kept up with the surface when diving is going on. Mr. W. Mills, Sunderland, makes a good show of aluminium for different purposes besides his system of boat lowering. The Mirrlees, Wa... n & Yaryan Co., Glasgow, have specimens of their evaporators in the North Gallery up to seven tons capacity, and a triple pump lately brought out by them for working on their heating and cooling. Boyle's system of ventilation for ships is well represented by a good exhibit, but as we recently gave full notices of the same in our May issue no further mention is necessary. The Sheathing Propeller Co. also show working models of their system, driven by a dynamo, as lately described by us. Messrs. Suter, Hartmann & Co. are to the front with a neat stand, on which is shown several photos of ships, both men-of-war and of the Mercantile Marine, and Holzapfel's Compositions Co. have, amongst other things a case to represent barnacles clinging to the side of a ship, illustrative no-doubt of what may be presumed to occur if their coating is

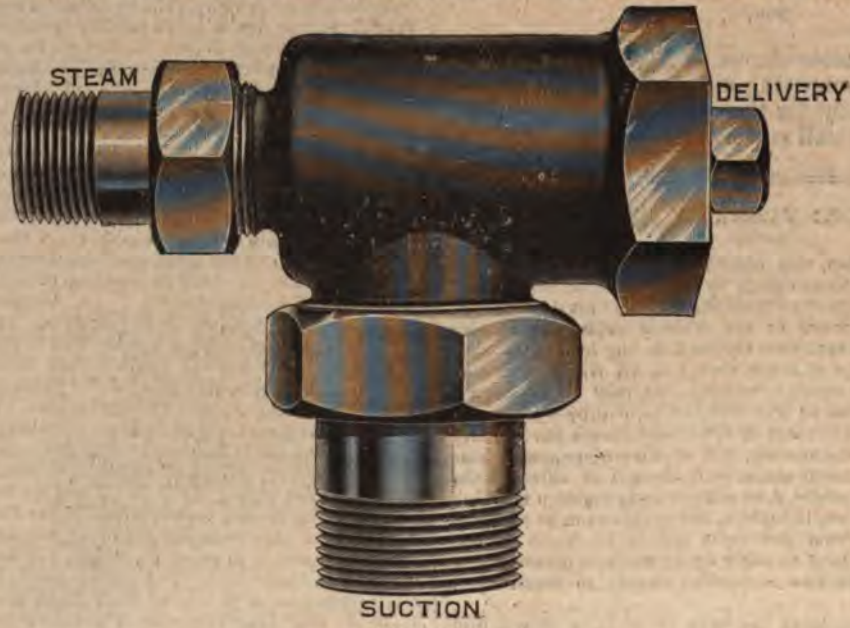


FIG. 3.

THE HANCOCK INSPIRATORS. (*See page* 124.)

system the different services required. Messrs. Royle, of Manchester, show their patent tubes for evaporation and kindred purposes, the chief merit of which is that the scale drops off automatically by the expansion and contraction produced by the not applied. Messrs. Chadburn, of Liverpool, have a collection of different sizes of their engine-room telegraphs, and Sinclair's Fire Extincteurs for ships and yachts are also well displayed. The Telegraph Construction and Maintenance Co. have a fine ex-

hibit, embracing sections of their cables, a model of their steamer *Britannia*, and specimens illustrative of the progress made in this branch of manufacture since cables were laid by them nearly 50 years ago. Messrs. The Earle Shipbuilding Co., Hull; Mackie & Thomson, Glasgow; Cook, Wells & Gemmell, Hull; Edwards Broz., Newcastle, and Hamilton & Co., Port-Glasgow, are the principal exhibitors of models of steam trawlers, these firms being well known in connection with this branch of shipbuilding. Messrs. Fleming & Ferguson, Paisley, have a good show for steam yachts, and there are the usual displays by up-river firms of pleasure boats and sailing yachts of all descriptions. An interesting exhibit is made by Mr. McLachlan, of Stoke Newington, of a portable electric propeller for shipping on the stern of any small boat like a rudder, the machinery part of which only weighs 35 lbs. for ½ H.P., and this is said to be capable of driving a 25 ft. boat at a speed of five miles an hour. The under water parts are all phosphor bronze, and the dynamo is placed out of water and ready for inspection by the removal of a cover. The only difficulty with all this class of gear is the recharging the batteries, otherwise the design is of the simplest possible character.

Amongst strictly inventions exhibits we notice Whitby's Patent Lifebuoys for day and night use, which being nearly or quite automatic in their action when thrown into the water, struck us as possessing some merit because they make a flare by night and contain every likely requisite for a man who may have fallen overboard. We were informed that one of these buoys was all that was ever recovered from the ill-fated H.M.S. *Wasp*, which foundered some years ago in the China Seas. Piper's Boat Gear consists of a specially designed hook which automatically detaches direc.ly the boat is water borne, and if the gear works as well actually as it does in the model there would appear to be a future for this invention.

We have been compelled from limits of space to take a hasty review of what is presented to us now at South Kensington, and though we are not able to compare it with some of its more notable forerunners, still there is a good deal of solid work to be seen there by those who are interested in the two branches of yachting and fishing. It will be gathered that the exhibits are of a fairly representative character as we have Trinity House leading, as it should do, and well-known firms are in the list who are caterers for the principal requirements in the shipping line, on the one hand for sport and on the other for gathering fish for our markets. We think it will be found that there is very little missing on the whole, considering the space available and the range of articles included under the two titles comprising the exhibition.

MARINE TYPE OF OIL ENGINES.

At the Yachting and Fisheries Exhibition now being held at the Imperial Institute, Priestman Bros. exhibit their marine type of oil engine, which has been thoroughly proved at sea and found satisfactory. The engine, which is illustrated in perspective in the adjoining diagram, develops about nine brake H.P., and represents the class of engine supplied by this firm for small pleasure boats, canal barges, &c., &c. Recently, Priestman Bros. have modified the design of their marine type of engine for the larger sizes, rendering it double-acting, and as there are two cylinders, two impulses are thus given to every revolution of the crank-shaft. For equal weight the power of the engine is about double that of the old type, an additional saving being effected in the size of the flywheel, which it has been possible to reduce to quite moderate dimensions.

This engine can be managed by a seaman who is not an engineer, and can be started at 15 minutes' notice. The room taken up is, we understand, much smaller than would be required for a steam plant of equal power.

The oils used are ordinary lighting mineral oils, which are stored in a reservoir in the base of the engine. By means of air pressure a jet of oil is forced through a spraying device in a heated chamber known as the vaporizer, the temperature of which is maintained when the engine is started by means of the exhaust gases. In this chamber the oil is mixed with an adequate supply of air, and the oil is then drawn into the cylinder during the idle stroke of the piston, compressed by the return stroke, and then fired either by an electric spark or a tube igniter. The cylinders are kept lubricated by the oil itself and require no additional supply. All valves are of the pot-lid type. In the larger engines it has been found advisable to arrange the cranks opposite each other. In this way the engine is very perfectly balanced and vibration reduced to a minimum. A governor is fitted which controls the speed of the engine by adjusting the air and oil to the work to be done. This addition to the engine is necessitated by the fact that the motion of the boat is reversed by means of the McGlasson propeller, the engine running in the same direction both when the boat is going ahead and astern. (A model of the propeller is exhibited on Priestman Bros.' stand.) It is of the two-bladed type. The angle which these blades make with the shaft can be adjusted by means of a hand-wheel. The tail shaft is hollow, and a rack passes through the central hole and gears with pinions on the stems of the blades. The other end of this rack is connected to a sliding collar beneath a fork operated by the hand-wheel. If desired this wheel can be placed on the deck. When sailing, the blades can be turned so as to be in line with the keel, and in this position they offer a minimum resistance to the progress of the boat.

Amongst other boats fitted with the double-power Priestman oil engines, mention may be made of the *Fleur de France*, now on the Seine, which carries an engine of 40 I.H.P., giving a speed of about ten miles an hour to a hull measuring 59 ft. long by 9 ft. 3 in. broad, and having a draught of 3 ft. 6 in. And the *Louis Dreyfus*, which is fitted with the same power, and is in constant use for towing purposes on the Black Sea, with regard to which the owner has written as follows:—

"It is with much pleasure that I have to inform you that the marine oil engine of 30 B.H.P. which you supplied me with for my launch-tug *Louis Dreyfus*, has given me great satisfaction, especially for towages, worked daily in Kertch roads, in fact, lately it was towing two lighters loaded with grain of about 350 tons each. The said engine is working in stormy weather exactly as it does in calm weather."

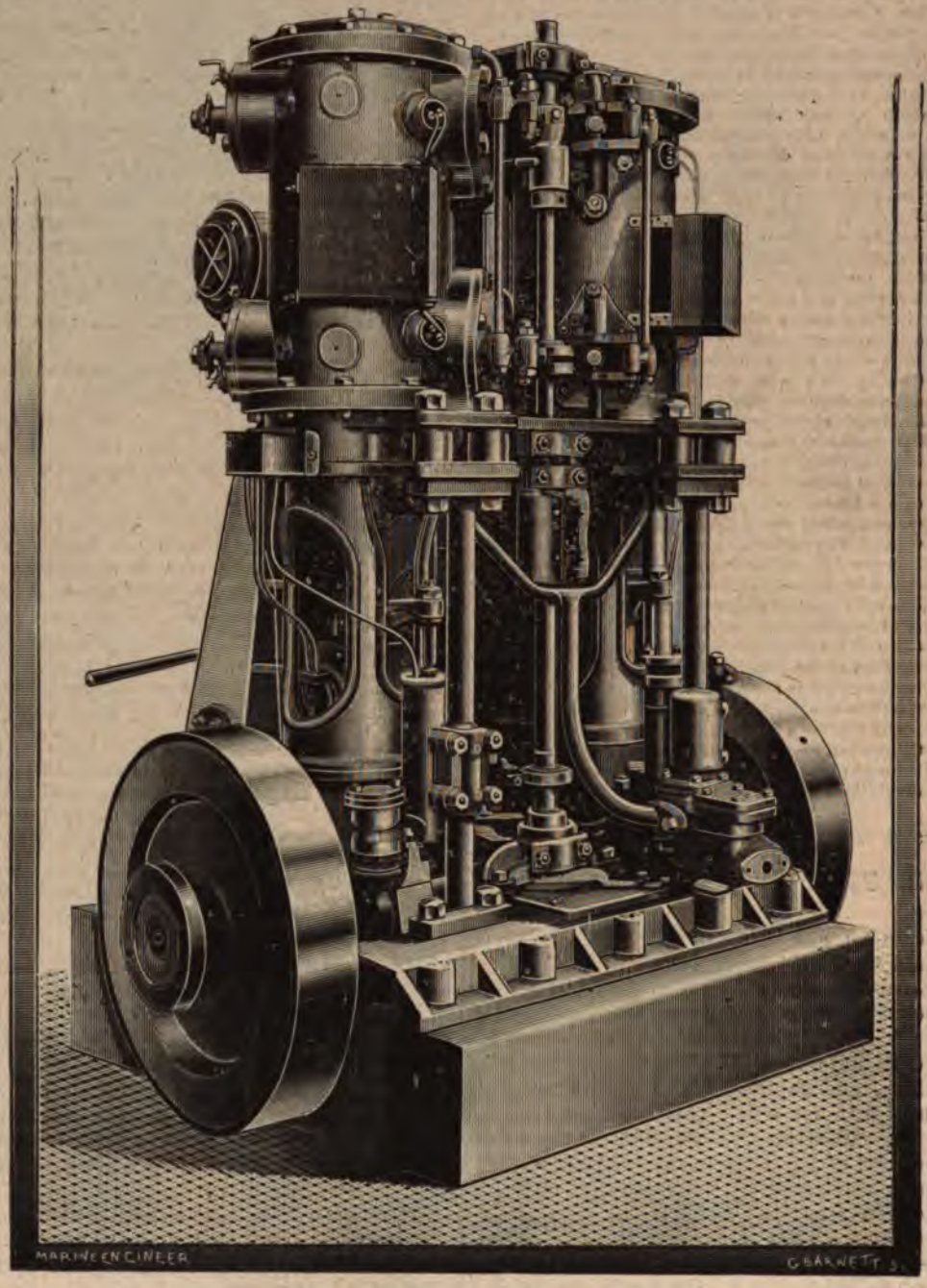
Engines of the marine type are now made in sizes of from 3 to 90 I.H.P.

Priestman Bros. also exhibit a working model of the dredger and excavator, and call visitors' attention to the following facts relating to this specialty, which speak for themselves:—

It has been claimed for the Priestman dredger that it has been adopted by 22 Governments, 118 machines have been supplied to Governments alone. The New South Wales Government have reported, in their official statement on dredging, that 18 Priestman's grab machines have been working at the various ports and rivers. The first cost and annual expense of

working the ladder dredgers is so considerable, that many of the rivers would have remained unimproved had not the grab dredger been built. The facility offered for disposing of the silt by utilizing it in the formation of the banks render them specially suitable for work of this kind."

"That machine (the Priestman elevator) saved us £3,000 a year in the discharging of ships, it rendered possible a new trade to us. The speed and economy of this machine were such that we were able to reduce our loading expenses upon the grain pretty nearly one-third of what it was before. This met the corn



Marine Type of Oil Engines.

This invention has been largely used by dock and railway companies for discharging bulk cargo, and Col. Birt, the general manager of the Millwall Dock Co. (who have about 50 in use), in giving evidence before the Royal Commission on Labour, we understand, made the following statement:—

merchants' difficulty, and without that bucket we could not do it."

The works of Messrs. Priestman Brothers, Limited, are at Hull, their London address is 73A, Queen Victoria Street.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

A Wonderful Feat

HAS been performed by some Swedish salvage engineers in regard to a steamer which sank in the Baltic Sea between Franska, Stenarva and Kohanni Light as long ago as the month of September, 1895. The wreck lay in such a depth of water that there was some difficulty and much time expended in finding it. Then means had to be devised for working under the exceptional circumstances of the case to be attacked. The vessel, it is said, lay in no less than 200 ft. of water. It seemed hopeless to work with the ordinary diver's dress. For though depths of this magnitude have been previously explored by divers, notably those who went down to the wreck of the Spanish mail steamer *Alphonzo XII.*—the men never attempted to do more than recover valuables. Here patient and long continued efforts had to be made. The method of raising the vessel was by attaching a number of small pontoons to the vessel by means of toggles passed through her scuttles, and, of course, the toggles had to be placed in position by human agency. The ordinary diving dress was superseded in this case by the use of Waller's patent tubes. These consist of a tube by which a man can descend from the surface to the required depth of water. The tube, which is open at its upper end, terminates in a bulb wherein the man has room to work. The whole is watertight. Below the bulb are ballast tanks to effect and control the submersion. But in the side of the bulb are glass scuttles, whereby the operator in the tube can see external objects, and his area of vision can be illuminated by electric light. A raft floating on the surface of the sea supports the tube and carries a crew who control the depth of the submersion of the tube under the direction of the submarine operator. They, of course, can also shift the whole affair laterally in any direction, when he desires them to do so. The operator is furnished with tools which work through a watertight joint in the side of the bulb, under the view of the scuttles, so that the man is able not only to work outside, but to see the effect of what he is doing. By these means, in the case of the vessel under discussion, which happened to be a passenger vessel, and, therefore, was pierced with numerous sidelights, it was possible to break the glasses of the scuttles and to insert the toggles for the connection of the steamer with the pontoons above. This being accomplished, the vessel was, on the 22nd February, moved a very considerable distance nearer the shore, and, at last, on the 3rd June, 1897, she was safely towed into the harbour of Stockholm. It would appear that this invention, which has now stood so severe a test, may, for certain purposes, supersede the use of the diving dress, and enable work to be carried out at much greater depths than have heretofore been attempted. But it will of course be seen that there are many purposes for which it cannot compete with the older institution. For example, in clearing a vessel's screw the actual contact of the diver with his work must conduce to rapidity and effectiveness of action. Again, the Waller's tube can only be used where a man can get straight down to his work. It would not allow a man to go down the passages of a flooded mine, nor enable the deed of Lambert, who shut the watertight door in the Severn Tunnel, to be repeated. Nor would it permit of the entering of a submerged ship unless her decks were first opened up, which, of course, would tend to make her salvage impossible. Still for very many purposes the new invention may prove valuable in a branch of operations which have of recent years made wonderful strides, especially in the Baltic and in the Mediterranean Seas.

Publications.

The *Strand Magazine* for June was a double number—at double price. It contains a short article on Atlantic Captains, which promises to be followed by others. The reader is treated to some tales (which some of us have heard before) about Captain Haines, late Commodore of the Cunard line, and about the "Commodore bar tender," of the same line. Two White Star Captains have also been interviewed, and the brave deeds, which made the name of Captain McKinstrey of the *Germanic* a household word, are rehearsed. With Lieutenant McKinstrey, R.N.R., whose fame is of a very active and daring character, is given Lieutenant Thompson, of the company's great cargo boat the s.s. *Georgic*. He boasts that his service at sea has been so uneventful that in upwards of a quarter of a century he has not only seen no disaster, but has not even seen a natural death at sea. There is also a sketch of the life of Captain Jamieson, who commands the American liner *St. Paul*. Portraits of all these gentlemen, and of the bar tender are afforded. But they are not—at least in my copy—up to the usual *Strand* form, save in the case of Captain Jamieson. By the way, I think my way of spelling this gallant officer's name is the one he himself uses, though the writer of the article systematically omits the "e." The interviewer, in fact, is not apparently familiar with the North Altantic trade, though he certainly knows how to get up a series of interviews. I base my conclusion as to the writer's want of familiarity with the matters he deals with on the ground I have stated coupled with the fact that he refers to *La Gascogne*, of the Compagnie Générale Transatlantique, as the *Gascoigne*.

A Curious Advertisement

appeared in the agony column of the *Times* of the 12th June, 1897. It ran as follows:—

INFORMATION WANTED.—A steam vessel was sold at Gravesend on or about the 22nd September, 1833, called the *Royal William:* Was she sold at public auction after being duly advertised, and if so what was the name of the person or firm who sold her, and what was the description given of her, and the terms of the sale; in what public print was the sale advertised and where can a copy be obtained?—Address James Walker, 16, Tivoli Place, Ilkley, Yorks.

The vessel referred to is, of course, the first *Royal William*, which was the vessel built at Three Rivers, and so carefully described by the Canadian antiquaries, whose patient and exhaustive researches have been noticed more than once by me in this column and elsewhere in the MARINE ENGINEER of recent years. The information which Mr. Walker seeks could, no doubt be easily obtained if one had the time to devote to the search. But it is information of a kind which does not generally appeal to those who make the history of the development of steam navigation their object in tracing out the lives of these old vessels, it seems more the dry history which a lawyer seeks in working out a title. But at all events the appearance of this advertisement would seem to show how keen is the interest taken in the minutest details regarding the birth of steam navigation.

The Pacific Steam Navigation Company

have, in continuance of their characteristic policy of working with a modern and economical fleet, disposed of the old liner *Potosi*. She was one of the vessels built at the time of their great expansion in the early seventies, and was turned out from the Fairfield yard. She was a big vessel for the time when she was built, being over 420 ft. long, and having a gross register of 4,219 tons. She was one of the vessels which were, in the early days of the Orient Line, sent out in the Australian service, and she therefore did her share towards building up the reputation of that company. She has now gone to foreigners, being disposed of through Messrs. C. W. Kellock & Co., of Liverpool—the firm through whose hands the spent vessels of the line always pass.

The Hamburg-American Line

has just celebrated its jubilee. The occasion was marked by festivities at New York on board the company's steamer *Furst Bismarck*. But the chief commemoration was naturally held at Hamburg, the head-quarters of the line. Here a banquet was given in the saloon of the *Augusta Victoria*, fresh from her overhaul and improvements at Belfast. The guests were representative and important, including Prince Henry of Prussia and some important official visitors from the other side of the Atlantic. The anniversary was the 27th May, for it was on that date in the year 1847 that the company had its inception. It started with a modest little capital of £22,250 sterling. But, in those days it had not ventured on steam. Its pioneer vessels were little sailers some three hundred tons each. It was in the year 1851 that it first turned its attention to steam, and ordered a couple of iron screw vessels from Messrs. Caird & Company, on the Clyde. I may mention that they were very good clients of Messrs. Caird for many years. But at last the development of German yards and the desire for "greyhounds" caused the connection to cease. The first two vessels were ordered at a very fortunate time for the line. The Crimean war came and they were taken for transport work, so that they were better employed for a while than they would have been in the Atlantic trade. It was not till 1856 that the first trip to New York was undertaken by

one of the line's steamers; and at first the new move was not very encouraging, for a dividend was not distributed till 1861. In 1867 the New Orleans line was inaugurated. In 1875 the first of the numerous amalgamations took place, the rival Adler Company, which had been started some two years previously, being then bought up. This and previous expansions raised the company's share capital to just twenty times what it was when the company started operations, and in addition there were debentures amounting to about £750,000 sterling. Times were bad in the years succeeding the amalgamation, as those who watched the trade between Liverpool and New York in those years will remember. So in October, 1877, the capital was written down to £750,000 sterling. Another line, also belonging to its native place, was absorbed in 1886 and in 1891 the Hansa Line was swallowed up. About the year 1892 it was determined to re-organize the company's fleet. Numbers of older vessels were disposed of. It was determined to conduct the business with the largest and most economical vessels to be had. In pursuit of this policy the twin-screw cargo boats of the "P" class have been built. Of these, five were originally constructed. They ran up to seven thousand tons gross register, and were so successful that the leviathan *Pennsylvania*, now the biggest vessel at work, was ordered from Messrs. Harland & Wolff, to be followed by a sister from the yard of Messrs. Blohm & Voss, of Hamburg. Meanwhile another class of cargo boats—all of whose names had the initial "A"—were being turned out from British yards. More recently the Hamburg-Calcutta line has added its fleet to the lists of the Hamburg-American line, and, altogether, the company owned at the close of 1896 a tonnage of 241,000 gross register. Additional tonnage is building sufficient to bring the grand total up to 300,000 tons, which would make the company the largest in the world in point of size of fleet. Its capital is now two and a quarter millions sterling, and last year it paid its shareholders an 8 per cent. dividend.

Perhaps the most striking move of the company, to the general observer at least, was its entering into competition with the North German Lloyd Company—which till then had had the monopoly of the traffic between Southampton and New York—with its fleet of four twin-screw express steamers in 1889. The pioneer vessel of this service was the *Augusta Victoria*, on board of which the celebration was held the other day, and which has since that occasion re-entered on her work, enlarged, accelerated, and improved. The vessels of this service are quite equal to-day to hold their position against any of their competitors, and at the time of their appearance were superior to anything outside Liverpool. The various connections now maintained by the line are within the knowledge of most of my readers. There are fast and slow lines to New York, and frequent service to all the important ports of the east coast of America between the St. Lawrence and the Mississippi.

The New Canadian Atlantic Service.

Since I last wrote on this subject much has been made public. The new contractors, Messrs. Peterson, Tate & Company, have published their intentions in regard to the matter. It appears that the old terminal ports are not to be forsaken after all, in spite of the pleading of Mr. Sandford Fleming in the pages of the *Queen's Quarterly*. The St. Lawrence and the Mersey are still to be the objectives. So far, good. But I am more than surprised to hear that the vessels, which it is said, are "to equal the *Campania* in speed and comfort," are to be built of the turret type. This may be a most excellent type for cargo vessels—indeed, it must be so, or such keen business men as those who direct the fortunes of Clan and Angier Lines would not be adopting it—but it does not look as though it were specially, or at all, adapted for passenger ships. It would be a thousand pities if a new departure were to be adopted in this regard which might imperil the popularity of the line with passengers, and so prejudice the link which we have so long desired to see forged to connect our little island with its great colonies in the west and south. But one cannot help having the greatest misgivings in regard to the whole business. Personally, I don't like the idea of the turret ships. I should rather hesitate in putting forward that opinion, where my judgment is opposed to that of practical men whom the British and Canadian Government unite to honour and confide in. But I am somewhat emboldened to differ when I see that along with the turret idea is one which all men may well make bold to call ridiculous. The fleet is to consist of four vessels of 10,000 tons each. Of these, two are to be at work, giving a fortnightly service, within two years. The others will follow and make the service weekly, twelve months later. In passing it may be remarked that it will be interesting to see if these ships really approach the great Cunarders in speed. But a fifth vessel is to be provided. It is she which excites my distrust of the whole scheme and that apart from any other consideration. Lest I should appear to be stating the case in an unfair way I will quote from the *Shipping Gazette*, which certainly does not appear hostile to the contractors or their device. "Apart from the details in regard to the design of the steamers, the contractors have had to face a very tangible difficulty in combatting the fogs of the St. Lawrence. . . . Mr. Petersen set himself to solve this hitherto almost unsolvable problem, and hit upon the happy and thoroughly feasible plan of employing a fast little craft of the torpedo boat type, to act as pilot and danger signal to the ocean steamers. The little vessel is designed to travel down the river and meet the incoming steamer, and is to be fitted with a sound signalling apparatus and a powerful electric search light. . . . She will meet the approaching steamer on her passage up-river, sounding her signals at intervals, and giving an extra signal in case of danger. Taking charge of the steamer she precedes her, and, acting as a pilot, enables the navigation of the waterway to be conducted at a comparatively high speed, but nevertheless with comparative safety." The paragraph I have briefly quoted is printed by my contemporary in large type and is from the pen of their Newcastle correspondent. It concludes with a statement of the "great appreciation" with which the Canadian Government has accepted this "excellent device." But I imagine the Canadian Government is composed of neither sailors nor pilots whilst I also feel sure that the Newcastle correspondent of the *Shipping Gazette* who went to see the firm which is at the moment in such prominence was a most experienced journalist, and one who did not allow the light of his own knowledge to obscure the "happy idea" upon which Mr. Petersen had hit. What does it all mean? I am sure Mr. Petersen is welcome to all the credit his labours may bring him, and I hope his "happy device" may prove as valuable as he expects. If the torpedo boat can find the liner to guide her, she could also find her to put a pilot aboard of her. That is to say, the pioneer can have on board no guide whom she might not be able to put aboard the guided. I suppose the big boats will draw 26 ft. of water. A torpedo boat draws more like 6 ft. Her search light then will prove a mere will-o'-the-wisp unless she maintains constant soundings based on the draught of the vessel she is piloting. Surely a liner with a big crew and lots of deck room is more suitable for all this sounding than a little craft. But let that pass. Let us even assume that the little vessel is instinct with knowledge that cannot be put aboard the big ship. What good will she be? Has Mr. Petersen ever heard of or seen a sea fog, either in the Gulf of the St. Lawrence or in British waters? Does he not know from hearsay, at least, as some of us know from experience, that what sailors call a dense fog means an atmosphere so thick that the officer on the bridge cannot see the crow's nest, and that the most powerful light that ever was put into a lighthouse is obscured at a few yards' distance? The search light will be useless unless the torpedo boat runs the chance by her proximity to the liner's bows, either of being run down or of leading the liner into shallow water as she avoids a collision. I do not say that the St. Lawrence is so bad as Mr. Petersen makes out in the matter of fogs, but I do say that when fog is encountered, either in the St. Lawrence or elsewhere, so dense that a leading boat of light draught is required to pilot a mail steamer, it is quite time for the captain to stop his engines and drop his pick.

But the letter of Mr. James Huddart in the *Times* of the 7th June is the most serious indictment of the acts of the Government. It is well worth the perusal of any who can see it in its entirety. Mr. Huddart ridicules the torpedo idea, like the practical man he is. Otherwise he leaves the contractors and their schemes severely alone. His complaint is against the authorities. He shows how for years he has been working up opinion, both at home and in the colonies, towards the idea of this scheme, which he undoubtedly brought into the region of practical politics. He shows how, long ago, he got the promise of a subsidy from the Canadian Government. But that would not enable him to work out the scheme according to his estimates. And so he asked for an additional subsidy from the Home Government. This he could not get. But he, as he says, "plugged away," and at last the Home Government said something about

helping the scheme. But it made conditions as to the advertising for tenders. So Mr. Huddart, after all he had done, was put back at scratch with any who chose to tender for the contract. This was hard enough. But the monstrous thing is that the persons who have now received the contract did not even tender as desired. They came in afterwards. The faith of a Government department has long been proverbial, and we must not be surprised that governments live down to their ideals. But in this instance it is not only Mr. Huddart who smarts under a sense of wrong. The action of the Government has perhaps postponed, and certainly prejudiced, a scheme which might have done incalculable service to Canada, and to the federation and defence of the empire of which we are all so proud, and in whose strength we all exist.

The Castle Line.

Sir Donald Currie's company made a characteristic announcement in regard to their homeward bound steamer *Dunvegan Castle*, which left Capetown on the 9th June and was due at Plymouth on the 25th. Passengers were informed before sailing that they could, as usual, land if they desired to do so at Plymouth with the mails, but those who desired to do so could remain on board the vessel which was under orders to proceed to Spithead for the great Naval Review. Those who availed themselves of this opportunity would be "the guests of the company." This is a very handsome and generous invitation, and one which should not be forgotten by the travelling public, especially when it is remembered what immense sums were being charged by other companies for accommodation in their crack ships at this same review.

The "Times,"

in celebration of the Queen's long reign, gave a reprint of its Coronation number. The reprinted issue is that of 29th June, 1838. Here we find an advertisement which will be of interest to all readers. It is headed

Steam Navigation to New York from Liverpool.

"The City of Dublin Steam Packet Company's unrivalled safety steamboat the *Royal William*, Lieutenant W. Swinson, R.N., commander, 617 tons burden, 276 horses' power, will sail from Liverpool for New York, without touching at any port in the Irish Channel, on Thursday, the 5th July, at 6 o'clock in the evening. The character of this superior vessel for speed and safety is already well established. She is constructed on the plan of being divided into separate compartments by watertight bulkheads, and which has given such security and confidence to the public. The *Royal William* will remain ten days at New York, to allow travellers to visit the splendid scenery of the Hudson River, and the celebrated Falls of Niagara. Her return from that port, will, therefore, be postponed until the 29th July. The cabin accommodation of the *Royal William* are such as to ensure every comfort to passengers. Fare, 35 guineas, including wines and also stores. An experienced surgeon will accompany the vessel."

The advertisement concludes with a list of the company s agents in various home ports, and an intimation that passengers will be conveyed free to Liverpool from any of the places named in the advertisement.

It will be seen from this interesting advertisement that in the early days it was possible to make the high fares then charged cover even the expense of supplying the passengers with wines. Thus not only were a very thirsty class provided with as much as they could manage, but what nowadays proves to be a very handsome source of revenue to the company, namely, the profits on the sale of intoxicating liquors was altogether lost. We see too that in these early days the policy recently seen to be so wise of making inclusive fares from other places besides the actual port of departure was seen to be valuable to the shipowner. We are distinctly told, too, that the owners of the steamer are the City of Dublin Company. That corporation, therefore, was alike the parent of the P. & O. Company and the forerunner of the Liverpool Atlantic lines. It is fitting indeed, that this year which has seen it renewing its youth with the new twin-screw steamers for the accelerated Irish Mail contract, should see its managing director, Mr. William Watson, receiving a knighthood at the hands of Her Majesty the Queen.

Other advertisements in the same paper show us that by this time there were plenty of opportunities for crossing the narrow seas. And coasting steamers were plying in all directions off our shores. The "splendid steamship," *Princess Victoria*, for example, which plied to Antwerp, was under command of a gentleman who a few years later had charge of a big Atlantic liner

A large French Steamer,

under charter to the French Government for the conveyance of troops to the far East, went on to some rocks near Tourane, on the 28th of January in the present year. She was subsequently beached, and there was fortunately no loss of life. But the position of the ship seemed hopeless. She was very badly holed, the edges of the wound were pressed outwards, and the vessel had a heavy list towards her wounded side. But the Liverpool Salvage Association were asked to send out an expedition, and they succeeded in getting the vessel afloat on the 3rd May, and twelve days later she was fit to start from Tourane for Singapore, where her final repairs were to be undertaken. It is very pleasant to record this feat by Englishmen for Frenchmen, and that especially in salvage matters, for here we are too apt to find that the work is left by our people for the foreigners to do for us.

Merchant Ships at the Naval Review.

The Review takes place too late in the month for me to notice it now. But it is interesting to see what a large and representative assemblage of merchant ships will be present. There will be the Cunard *Campania* and *Bothnia*. The former with guests of the Admiralty, and the latter with paying visitors, she being let to a private speculator. The White Star steamer *Teutonic*, will be present with a number of Mr. Ismay's guests. She will be in the trim in which she would be found when the country had need of her services as an armed cruiser. Her guns are shipped, and her complement of naval blue jackets are on board in addition to the officers and men of the Royal Naval Reserve, who are charged with her navigation under ordinary conditions. Then the American line has the *New York*, flying the stars and stripes. The Germans have the *Columbia*, en route for New York. The Compagnie Gorerale is represented by two ships—*La Normandie* of their Atlantic mail service, and the *Versailles*, once flying the German flag. The *Dunvegan Castle* and the *Scot* represent the rival mail boats to the Cape, whilst the Union Company shows the *Guelph* as an example of its intermediate service to South Africa. The P. & O. Company has the *Rome*, the *Carthage*, and the *Caledonia*. The Orient Company, the Ophir, Hull, is represented by the *El Dorado*, and the West India line by the *Danube*. Other ocean steamers might be mentioned. But besides these, there will be innumerable Channel vessels. The London Brighton and South Coast, and the South Western Railways will have sent out all their available vessels, and the Isle of Wight Company will reap a rich harvest too. But vessels from ports all round the coast are bringing their contingents, and the sight will not only be one of warships, but will be a wonderful exposition of what steam navigation generally means in the present year of grace.

Lieutenant Clifford, R.N.R.,

the fourth officer of the *Scot*, has performed a very gallant deed, though, so far, it does not seem to have received the attention it deserved. The big steamer, homeward bound from the Cape, was rushing through asomewhat heavy sea a good hundred miles to the south of Madeira. Most of the passengers who were on deck were taking it easy after lunch. There too was Lieutenant Clifford, off duty and dozing. Suddenly there was a cry of "Man overboard," and without a moment's hesitation, the scarcely aroused sailor sprang overboard after the unfortunate fellow in the water. Who the man was, the distinction he had attained in certain walks of life, and how he came into the water, are matters that do not concern us here, and that certainly did not affect Lieutenant Clifford in making up his purpose, for he could not have had time to realise anything, save that a fellow creature was in peril. Already the vessel, travelling at between 16 and 17 knots, had got a couple of cables from where Mr. Barnato was struggling, and his would-be rescuer never reached him. Thanks to the twin-screw principle and the discipline of the Union Line, the big ship had got round and a boat lowered in time to pick up the exhausted officer and all that was left of the man he had tried to save. It is reputed that the relatives of the dead man have made a handsome money present to Lieutenant Clifford. But something more than money is due to such a man. For the danger incurred in jumping from the *Scot* at full speed is not confined to the chances of being drowned. A serious risk of a more horrible, though much more rapid, death is incurred. This vessel's

screws are set further apart than these more recently constructed, and there is a very great chance that one who does not strike the water well clear of the ship may be cut to pieces. One may hope to see both the Union Company and the authorities taking notice of a deed of this kind. Lieutenant Clifford is, I believe, an old *Worcester* boy.

The P. & O. Company

are reverting to old methods. In the days before Brindisi became their mail port and when the Isthmus of Suez was still uncut, Alexandria was the objective of the vessels employed on the western part of the service. The heavy mails came round to Southampton *via* Malta and Gibraltar, whilst letters and despatches, with the passengers to whom time was precious, left the steamer which had brought them from Alexandria at Malta, and were conveyed to Marseilles by a fast branch steamer. The vessels employed in this service to attain the required speed, were built on the paddle principle, long after the main fleet had adopted the screw. They were in fact fast despatch boats. Now things are, under the new contract, to revert, in some measure, to old fashions. The part of Marseilles, long deserted by the mail boats in favour of Brindisi, is again to be visited. There the bulk of the passengers will be embarked and landed. But the mails are still to do *via* Brindisi though the great ships will not call. A special type of vessel, of which the *Osiris* and *Iris* will be the first specimens, is being built to run with the mails from Brindisi to connect with the great ships at Suez. These vessels are to do their voyage in 48 hours, and will thereby save something substantial on the times of the present tables. They are to be of 2,500 tons and 6,500 H.P. This seems a greater power in proportion to size than that of any steamers now engaged in the Atlantic competition. But further details are wanting. It is interesting to note that these vessels will be the first ocean boats designed to run without an ounce of cargo. The possibility of cargo becoming an inconsiderable item in the budget of the Atlantic Liner has long been discussed, but it would appear that the *Mediterranean* is to be the first to make its absence an actuality.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

The Naval Review.

THE most engrossing naval topic has been, and is yet, the great Diamond Jubilee Naval Review recently held at Spithead, and next to that the manœuvres which are about to follow. The chart prepared under the supervision of Rear Admiral Wharton, the Hydrographer of the Navy, is a most elaborate affair and shows seven lines of vessels, five of which are composed entirely of ships of Her Majesty's Navy. There are two lines of battleships and cruisers, "B" and "C," 29 of the former and 30 of the latter; one line of third-class cruisers, gun vessels and torpedo boats, 38 in number: a fourth line of 48 destroyers and gunboats; and a fifth of 20 torpedo boats. Of these 165 vessels but 131 can be reckoned as efficient fighting ships, although perhaps the *Alexandra* and *Inflexible* might, by an optimist, be added to these—a truly magnificent display of the sea power of the British Empire. The disposition of this great fleet leaves little to cavil at and every credit is due to the Commander-in-Chief at Portsmouth and Captain Hawkins-Smith for the manner in which they have made use of the space at their command. The arrangements in advance were all that could be desired. The House of Lords had the steamship *Dunera* placed at their disposal, the Commons were accommodated in the *Campania*, and these vessels, with others carrying distinguished guests, were allotted favourable positions for witnessing the spectacle. Permission was granted to officers of the warships to invite friends on board for the occasion, a favour which was taken full advantage of by most, although civilians were obliged, willy nilly, to remain out of sight as the Royal Yachts passed.

The Vessels in the Review.

The method of anchoring the ships was particularly suitable for exhibiting the enormous development in naval architecture which has taken place in the last ten years. Many of the first-class vessels which took part in the review of 1887 are now in the training service and if we were asked to name one point in this review which differs from all previous ones in Her Majesty's reign we should without hesitation say the absolute newness of the ships which took part. Of the battleships there were only seven in the review just held which took part in that of ten years ago. They are the *Alexandra*, *Devastation*, *Thunderer*, *Inflexible*, *Dreadnought*, *Colossus*, and *Collingwood*, the rest, with the possible exception of the *Benbow* and *Howe*, are all very much under ten years of age. The torpedo-boat destroyers present gave us a class of vessel unthought of ten years ago. Torpedo boats had been designed and built, and partly to counteract their influence "torpedo gunboats" or "catchers" had just been produced but the "destroyer" is a product of the time which has elapsed since the last great naval review. The vessels representing European and other powers are worthy of mention. France sent us the *Pothnau* as a type of her fighting ships, Germany the *Konig Wilhelm*, Russia the *Rossia*, Austria the *Wien*, and Japan the *Fuji*. Of course they are not at all types of the best or most powerful owned by the respective countries, excepting perhaps the *Fuji*, yet doubtless a great many of the sightseers believed they were, or, argued they, why were they sent to represent navies of which we are said to fear so much?

How the Ships were Disposed.

By the arrangement in which the five rows of ships of Her Majesty's Navy of all classes, were moored; four wide waterways were formed up, which the Royal procession passed. Beyond these, on the south side, was a line composed of the foreign men-of-war, and another of the British Mercantile Marine. The Fleet was divided into groups and subdivisions, a senior officer's ship being appointed to each group. The senior officers' ships, for the ships numbered from 1 to 11, in lines B and C, were the *Magnificent*, *Majestic*, *Sans Pareil*, and *Alexandra*, with No. 23 torpedo boat in attendance, and vessels numbered from 12 to 30, in the same line the senior officers' ships were the *Blake*, *Flora*, *Hermione*, *Australia*, *Endymion*, and *Minerva*. Ships numbered from 1 to 21, in "D" line, 1 to 21 in "F" line, and 1 to 20 in "G" line; the senior officers' ships were the *Mersey*, *Landrail*, *Hazard*, *Halcyon*, *Research*, and torpedo boat 85, while the *Raven*, *Active*, *Decoy*, and *Haughty* performed the same office for vessels numbered 22 to 38 in "D" line, and 22 to 48 in "F" line. The chief duty of the senior officer was to see the mails were transmitted without delay to his sub-division; he also had a boat told off for his special use in order to facilitate communication between the groups of ships, and for keeping in touch with the postal torpedo boats. Yachts, and other craft had places assigned to them in Stokes Bay, and large merchant vessels were allotted positions behind the special merchant vessels. This arrangement was considered the only possible one by which all vessels could get a fairly good view of the Royal Yachts.

Portsmouth Dockyard.

The chief sufferers from storm and stress of the great review appear to have been ships building here. Recently, in one week only, ten tons were built into the *Gladiator*, and up to now the number of tons built into her is still under 3,000. The battleship *Canopus* (to all appearances will be finished long before the cruiser, although taken in hand some time after the *Gladiator* was laid down. As a result of nearly six months labour, the weight built into the *Canopus* is considerably in excess of that built into the former vessel. Over a hundred a week have invariably been added to the battleship, and a steady average of work maintained, which is somewhat of a contrast to the fitful way in which work has been carried on as regards the *Gladiator*. Thus it is pretty certain that the larger vessel will be the first to be commissioned and hoist the pennant; the Admiralty apparently considering that we are more in need of battleships than cruisers. The activity that reigned before the Review has no parallel, since the days of the Russian war scares, during the administrations of Gladstone and Disraeli. In some departments there was absolutely no cessation of labour, and some 2,000 men were working quite sixteen hours a day. A noteworthy incident of the recent Jubilee time was the manner in which the offer of the Admiralty to provide naval officers here with seats to view the Royal Procession at 12*s.* 6*d.* a head. It was stated by some that the seats offered gave but a very indifferent view of the show, and consequently many tickets waited a long time before finding purchasers. The work on the various ships here for repairs, etc., has now somewhat resumed its former course.

The Improvements in Naval Engineering.

The development of steam machinery during her Majesty's reign, as shown in the vessels which assembled for the Review,

is remarkable indeed. The very earliest vessels in which steam was used as the propelling power dates back as far as 1801, but it was over 40 years later that the first screw warship was laid down. A year later tubular boilers came into existence, and in 1845 the Admiralty of that time had on order nineteen sets of screw engines. Then came the surface condensor, and consequent higher steam pressures and a more economical method of using coal in 1860. Eight years later the ironclad *Penelope* was built and twin screws fitted to her. This led to increased H. P. and speed in our men of war, and from the nominal 200 H.P. of the *Mermaid*, the first screw vessel, we had advanced to almost 8,000 H.P. in some ships. The type of engines in use was changed about this time, the vertical inverted type of engine superseding the horizontal type then in use, this being found to be hardly suitable for the higher speeds which our warships required, although the two cruisers, *Iris* and *Mercury*, were then being propelled at a speed of 19 knots. Then came the adoption of water-tube boilers in the Fleet, the use of which have now become so general. Many of the warships at Spithead last month contained no less than 100 sets of engines, in direct contrast to the early steam vessels of her Majesty's Navy, in which the propelling engines were about the only ones in use on board. New, comparatively speaking, as most of the vessels are which took part in the Review, the development in the machinery and everything connected with the engine power of the latest ships built, and those which were completed soon after this Review, is marvellous.

Battleships *v.* "Destroyers."

The able lecture which Admiral Colomb recently delivered at the Royal United Service Institution on the future relations of the battleship and torpedo, was as important as it was interesting. According to him, the battleship is destined to take a secondary place to light swift torpedo boats, and he even suggested that the change had already practically commenced. At any rate this seems to be the only logical conclusion that can be drawn from the lecture. The theory that the present gigantic and expensive battleship is to become obsolete, and finally to give way to torpedo boat destroyers, however much improved, is an excellent one—for causing discussion—but until a more searching test than has been afforded by the annual manœuvres of the last two years has been made, it is premature to rush to such a conclusion. The superiority in speed of the destroyer to the battleship is certainly a point in favour of the former, and even if their size and seagoing qualities are increased, there is no doubt that they will be able to retain their superiority. But against this must be placed first and foremost the length of time which the battleship can stay at sea, her search-lights and long range quick-firing guns. It requires a vast amount of skill, combined with reckless daring, for such small craft as the destroyers are to get near enough, without being seen, to effectually discharge their chief weapon of offence, as was proved to a great extent in the late China-Japanese war. Again, unless the weather conditions are good, the chance of the torpedo missing its mark are many. War alone will prove whether the battleship is in such danger from torpedo boat destroyers as Admiral Colomb and his friends would have us believe.

Devonport Dockyard.

The preparation of the contingent of vessels sent from here for the Naval Review on the 26th ult. gave us an amount of work which can only properly be appreciated by those who have had some actual experience of the business. The 50 odd ships sent to take part in the great Review, a demonstration said to be without precedent in the annals of history, would of themselves form a fleet which most Powers would have the greatest difficulty in the world in getting together. The Dockyard Keyham Factory, and the Hamoaze, looked bare and deserted when finally all the vessels had put to sea, a decided contrast to the state of affairs now the great show is over. The mobilisation is now an accomplished fact, and by this a great burden has been taken off the minds of those in command here. Now that the great pressure of work in connection with the Review is over, greater attention is being directed towards the construction of the battleship *Ocean*. The building of the *Canopus* at Portsmouth keeps pace with the construction of this vessel, in fact the *Canopus*, if anything, is now slightly heavier than the *Ocean*. The Jubilee celebrations here consisted of the firing of an elaborate salute and a feu-de-joie along an extensive line of both soldiers and sailors. It was one of the most extensive salutes which has taken place here for a long time and certainly very effective. The drafting of the engine-room and stokehold ratings of the ships taking part in the Review to their respective vessels a day before they raised steam, for trial purposes, gave that branch an opportunity of making themselves familiar with the machinery of the vessel before they left here, a step considered by all to be an exceedingly thoughtful one.

Stokers, Shipwrights, and Blacksmiths.

The insertions of advertisements in the Press for naval stokers and mechanics has been responsible for the belief which now undoubtedly obtains, that the Navy is in serious want of these particular and important members of each ship's crew. The alleged difficulty in obtaining men of this class was the cause of a correspondent writing to the First Lord of the Admiralty on the subject. It was pointed out that unless a little more encouragement was held out to the men the prospect of their joining in sufficient numbers was a slight one, and Mr. Goschen was asked whether it was not possible to offer slightly more advantageous terms to the men. The official reply pointed out that no inconvenience was being caused to the Naval service in respect of stokers, blacksmiths, and shipwrights, and that it was not proposed to offer any additional inducements to attract men to enter these ratings. The entry of stokers had been quite satisfactory up to the present, and although some difficulty had been experienced in obtaining candidates for shipwright and blacksmith ratings, this was probably temporary and due to the briskness of trade in general. In the case of shipwrights, continued the reply, it is understood that efforts are being made in some quarters to prevent entries, with a view to putting pressure upon the Admiralty to remedy certain alleged grievances which are not admitted by the Department. Maybe he demand for better conditions was asked for at an inopportune time, when the Admiralty officials were too much concerned with other matters, but there is certainly room for improvement in the condition of these branches of the Navy.

Chatham Dockyard.

The sudden demand for men for the mobilisation unfortunately showed us that in this particular point the Navy is not quite so strong as it might be, for several vessels were afloat without their full complements. The Medway Reserve was found to be too small to meet the demand and the numbers wanted had to be got from other ports. Nearly a thousand came from Portsmouth and Devonport, and Sheerness provided about 500, among which were included a number of men of the R.N.R. The enormous amount of work due to the mobilisation went off very smoothly, the result of the arrangements made, which were in this respect extremely satisfactory. Good progress is being made with the *Vindictive* and she has now almost reached the stage which will allow of her leaving her present abiding place. Extra hands have been put on to her, and though work on her about the time of the Review was not quite so energetic as could be wished for, much work is at present being done on her. The *Goliath*, which is to be launched next October, will need all the men engaged on her, if this is to be accomplished, to be kept continuously at work. The *Goliath's* engines were designed and constructed here and are after the pattern of the engines of the *Minerva*. The boilers are also ready for her. Despite the clause in the Estimates by which stokers are to be increased by 2,000, this rating has not yet reached its proper strength. A great many of those who have recently joined for the manœuvres are almost totally inexperienced, and it is feared that before the engine-room staff find them of much use the operations will be concluded.

Marksmanship in the Navy.

The official return, giving the result of heavy gun practice in the Navy last year, shows this to have been not particularly brilliant, and the most conspicuous example of this seems to be the failure of our heaviest guns. The 110-ton guns of the *Sans Pareil* and *Benbow* fired 6 and 7 rounds respectively, neither of them recording a hit. An average of 30 per cent. of hits was obtained from the 67-ton guns, breechloader. Out of 15, the *Camperdown* managed to secure 6 hits; the *Ramillies*, 8 out of 25; the *Nile*, 7 out of 22; the *Hood*, 7 out of 23; and the *Howe*, 3 out of 16. The *Rodney* did not manage to hit once, although she fired 16 shots, and the *Colossus* got one out of 17. A better result was obtained from the 10-in. guns; but the best results came from the 9 2-in. and 8-in. breechloaders. Of the muzzle-loaders the *Inflexible* fired 8 shots without a hit, and the

Dreadnought with the same result. As might have been expected the quick-firers have done fairly well, but in this case the ammunition expended does not show the result which in any way corresponds with it. The 6-in. quick-firers gave good results, and the average for the 21 vessels which fired this gun works out at one hit for every four rounds, not at all a bad performance. But altogether the result is not very encouraging, even allowing that the target might be a little bigger, and if a little more was spent in ammunition for practice purposes it would hardly be wasted. The tendency ought to be to arm our ships with the guns which give the best results, both in target firing and general use.

The Navy in the Procession.

It was a welcome fact that the Navy was properly represented in the Jubilee procession, and we were glad to see that the engineering department was to the front, detachments of students from Keyham taking part, in addition to the other means by which the great body of naval engineers was brought to the attention of the public. There were included in the petty officers which lined Trafalgar Square engineers of warrant rank of several grades. The 500 men of the Royal Navy which lined the route in Trafalgar Square, after the procession had passed, were taken to the lawn in front of the new Admiralty buildings, and there, in a large marquee, lunch was served out to them. The toast of "The Queen" was responded by the seamen with a cheer that somewhat startled the occupants of the adjoining stand, erected for the Colonials and guests of the Admiralty. There were also 300 seamen, with 400 men of the Royal Marine Light Infantry stationed at St. George's Circus. This party, with the guard of honour for St. Paul's, paraded on the Horse Guards Parade before proceeding to its destination, and during the march along the route to take up the places allotted to it at St. Paul's and St. George's Circus, the cheers were perfectly frantic. The Naval guard of honour for Buckingham Palace also paraded on the Horse Guards Parade and after the Queen had left Buckingham Palace proceeded to Trafalgar Square. In the actual show itself no sooner did the bluejackets of the naval gun detachment come into view than the enthusiasm broke out in a rapture of delighted recognition. The naval officers who took part in the procession as aides-de-camp were objects of much interest. Lord Charles Beresford was there riding a grey charger with the utmost ease and dignity.

Sheerness Dockyard.

We had an extremely anxious and busy time for a fortnight before the Jubilee Review, here, owing to the getting ready of the vessels selected to take part in it, which were being attended to at this yard. Internal defects had to be made good on the *Sans Pareil*, and several destroyers had to be taken in hand. Vice-Admiral Nicholson came down to witness the commissioning of the Medway Fleet Reserve contingent, and the sight presented by the assembled ships was most attractive. Sheerness was represented in the London procession by a detachment of fifty petty officers and men from the school of gunnery. Vice-Admiral Nicholson inspected the cruisers *Barracouta* and *Leander*, while here for the business above mentioned. They have both been commissioned for foreign service, and put to sea immediately after the Review. The *Barracouta* presents a very smart appearance. She was painted white at first, as is usual with vessels destined for foreign stations, but was subsequently painted black, presumably that she might be in uniformity with the other ships in the Review. The men at work on her were taken from the cruiser *Proserpine*, work on which has been practically at a standstill for the past three months. The *Hotspur* will very shortly be completed, and ready to proceed to Bermuda to take up her duties as port guardship there. She will probably be accompanied by the gunboats *Medway* and *Medina*, who are also destined for that port. A naval cycling club has been formed here in connection with the *Wildfire*. Sixteen riding members, and six honorary members compose the club at present. It has been decided to allow the men to wear cycling dress when out riding, but on condition that they wear it at no other times.

Naval Engineers and the Jubilee Honours.

It is with the keenest pleasure that we note the appointment of Chief Inspector of Machinery, Albert John Durston, C.B., the Engineer-in-chief of the Navy, to the Knight Companionship, of the Bath in the civil division, also of Chief Inspector of Machinery, Alfred Wood, R.N., and Chief Inspector of Machinery, James Wootton, R.N., to be Companions of the Bath, civil division. It must be admitted by everyone who takes an interest in the welfare of the engineering branch of Her Majesty's Navy that no man deserves the K.C.B. more than Mr., or rather Sir, A. J. Durston. Our hearty congratulations are due to him. The honour is especially appropriate just at the time when his admitted pluck and forethought have been demonstrated in such a practical manner in those magnificent successes, the two great cruisers or commerce protectors, the *Powerful* and *Terrible*. It is in great measure due to him that the water-tube boilers, with which they are fitted, and from whence comes the 25,000 H.P. of which they are capable, were used in them instead of those which, until quite recent times, have been so generally taken up. Sir A. J. Durston's lectures at the Royal United Service Institution on the subject of engines and boilers for warships are well known, and have always received that attention which they deserved. He is a practical and hard-working member of the engineering branch of the Navy, as are the other two gentlemen who have been honoured by Her Majesty. Chief Inspector Wootton is the senior officer of his rank and besides serving in the Arctic Expedition of 1875-76 was present at the bombardment of Alexandria. The engineering branch has received better treatment lately in the shape of honours and emoluments than ever before, and small as it is we are pleased to see that a step in the right direction has at last been taken.

The Promotion of Engineer Officers.

The Admiralty are said to have expressed their intention to promote to the rank of chief engineer some sixteen engineer officers, that they may counteract the deadlock which looks like taking place in the flow of promotion. This has been undoubtedly caused by the manner in which the optional retirement clause has been treated by the Admiralty, contending that the optional clause lay with them to exercise it or not, as they pleased. Fleet engineers until recently retired at 50; but the view which the Admiralty took of the matter made 55 both the optional and compulsory retiring age. Then the outlook for the youngest juniors was so far from meeting with their approval, that the Admiralty gave way to the extent of promoting 30 engineers to the rank of chief, the operation being extended over a period of two or three years. But the resultant stagnation as regards promotion for the junior officers plainly brought out the startling fact that the junior assistant would be retired before he could become a chief. But, taking it for granted that the Admiralty mean to rigidly adhere to the rule of retirement at 55, the intention to promote these 16 officers must be accepted as the best solution to a difficult problem. Something needs to be done, for this year there are only two senior officers to retire, and this is not likely to be improved upon for the next year or so. The advancement of Messrs. H. J. Oram, and E. Gaudin to inspector of machinery and chief engineer, respectively, is to be commended. Both officers have worked hard in the interests of the water-tube boiler, which they are both enthusiastically in favour of. The promotion should meet with the approval of all.

The Recent Trials of the "Turbinia."

The recent trial run of the *Turbinia* in which she made the extraordinary speed of 32·61 knots, or a little more than 37 miles an hour, conclusively proves that we have not yet reached the limit of speed in respect to rapid-steaming war vessels. The engines which make this speed possible are known as turbine engines, that is, instead of the ordinary steam cylinder with its piston moving to and fro the steam is driven against a wheel having slanted perforations upon the same plan as the turbine water wheel. By this method the construction is of the simplest. At one end of the shaft is the steam turbine, and at the other the screw, which propels the boat in the water. This comparatively new style of engine vastly simplifies the mechanism and permits of enormous speed of the screw. The number of revolutions made by the engines of the *Turbinia* is declared to be 2,500 per minute and it does not take but a small consumption of coal to effect this, the boat thus having the advantage of being exceedingly economical and yet a decided improvement on the present boat—when perfected. It is said to require only 27 lbs. of machinery for each of its nearly 1,600 H.P., about a quarter the weight required with the machinery now in use. Further tests have yet to be carried out, and if these turn out as

successful as is expected it can be confidently reckoned that a new era in steam navigation can be counted upon.

Pembroke Dockyard.

Work here on the ships building and under repair has once more commenced in earnest, after the excitement which has been general in all the yards in the South. The *Spartiate* is making good progress. She has been down nearly two months now, and the amount of material worked into her at present is proportionately about 100 tons per week, roughly speaking. It is curious to note, too, that her cost is some £200 less than the cost of the *Andromeda*, when that ship was about as far advanced as the *Spartiate* is at present. Several little delays have occurred, the upper part of the stern post being somewhat behindhand in delivery; one casting made at Sheerness yard was obliged to be condemned, as metal that would not stand the required test was found in it. The *Hannibal* progresses apace, but many grumbles are heard as to her insanitary state. Better measures have now been taken to improve the condition of the vessel which was complained of. It is not certain when she will leave for Portsmouth, but the electric fittings are yet incomplete, and it is thought that the whole of this work will not be completed till September. It has become clear to everyone, while the building of the *Hannibal* has been in progress, that we are under a grave disadvantage as regards the fitting out of ships at this yard. Situated as the vessel is, a great deal of time is wasted by the men having to go backwards and forwards in the launch to procure stores and prepare materials, and this unfortunate state of affairs will not be properly remedied until we are equipped with a capacious dry dock. A hitch recently occurred in the construction of the new jetty here owing to a difficulty between the contractors and the local employees, but this has now been overcome, and work resumed.

Armour Plate Trials in the United States.

Some interesting armour plate trials have taken place in the United States recently, with a view to determining the protective value of a warship between two thin armour plates superimposed on each other in close contact and a single plate of the thickness of the two combined. The test proved that the single plate was a much more formidable protection against armour-piercing shells than the two thin plates. The trial took place at the Indian head proving grounds. Another test took place at the proving grounds of the Bethlehem Iron Co., Bethlehem, Pennsylvania. A 10-in. plate, representing side armour for the new cruisers *Kearsage* and *Kentucky*, underwent a test which was successful in every way. The projectile which was fired at the plate only entered 3 inches, and then broke up, and the cracking shot failed to inflict the least injury on the plate. The result of the trial was that the whole group of plates were accepted. It may be mentioned here that the new dry dock recently built at Port Orchard, Puget Sound, at a cost of a million dollars, has shown a tendency to totally collapse. It appears that the sides of the hills surrounding the dock are almost honeycombed with springs, and lately, when the battleship *Oregon* was placed in the dock for repairs, the dock sides showed such an alarming tendency to give way altogether that the captain of the vessel gave instructions for the water to be let in, and refused to have his ship stay there any longer. The concrete foundation seems to have been badly laid. When H.M.S. *Hyacinthe* was in dock there some time ago, those on board could not help noticing that the construction of the big dock was somewhat defective.

The French and Russian Navies.

If the French papers are correct Admiral Besnard, the French Minister of Marine, has decided on the establishment of a military corps of workmen in the arsenals. In time of war the mobilisation of these men would take away all those employed in the actual building of warships and, in addition, all those working in the inland naval establishments, whose age renders them fit to be included in the general mobilisation, and who shall have been at least six months in the State dockyards or arsenals. This would practically mean the cessation of work as regards shipbuilding, and we do not quite see how such a scheme is to bear satisfactory results. The annual manœuvres of the French Navy commences on July 5th. There are now under construction in the French yards for the Russian Government one cruiser, two torpedo cruisers and fifteen torpedo boats. A gunboat is also being constructed in the Ginjal yards for service upon the Mozambique coasts. She is to have a displacement of 340 tons, and her chief armament will consist of two guns and two Maxim mitrailleuses. She is to have two vertical engines of 480 H.P. and her speed will be 11 knots per hour. Early in August President Faure will embark in the cruiser *Dupuy de Lome* on a visit to the Emperor of Russia. This vessel will be accompanied by the cruiser *Surcouf* and the ironclad cruiser *Pothuau*, recently over here to represent France in the great naval review.

THE INSTITUTION OF CIVIL ENGINEERS.

THE ENGINEERING CONFERENCE.

THE Institution of Civil Engineers has, this year, organised a conference on engineering subjects, which were classified under seven distinct sections, among which was one devoted to shipbuilding. The meetings were held at Westminster, on the 25th, 26th, and 27th of May last, and we have pleasure in placing before our readers the papers and discussions of the shipbuilding section, as they possess much interest to followers of our particular branch of engineering.

On 26th May the following paper on "The Relative Advantages and Disadvantages of Rotary and Reciprocating Engines as applied to Ship Propulsion," by the Hon. Charles Algernon Parsons, M.Inst.C.E., was read:—

The advantages of a rotary-motor for the purpose of marine propulsion are manifest as regards a direct application of the force of the steam to the shaft to be driven, and a consequent saving of bulk, weight, friction, and wear.

When such a motor is shown to be economical in steam consumption, and that the power delivered by the motor at a high speed of rotation can be economically transformed into thrusting power by the screw propeller, and that the whole of the machinery is simple and easy to work, the position of the rotary motor becomes well established as a rival of the reciprocating engine, provided there are no drawbacks to detract from the advantages which it manifestly possesses. Up to the present no such drawbacks have shown themselves, or seem likely to.

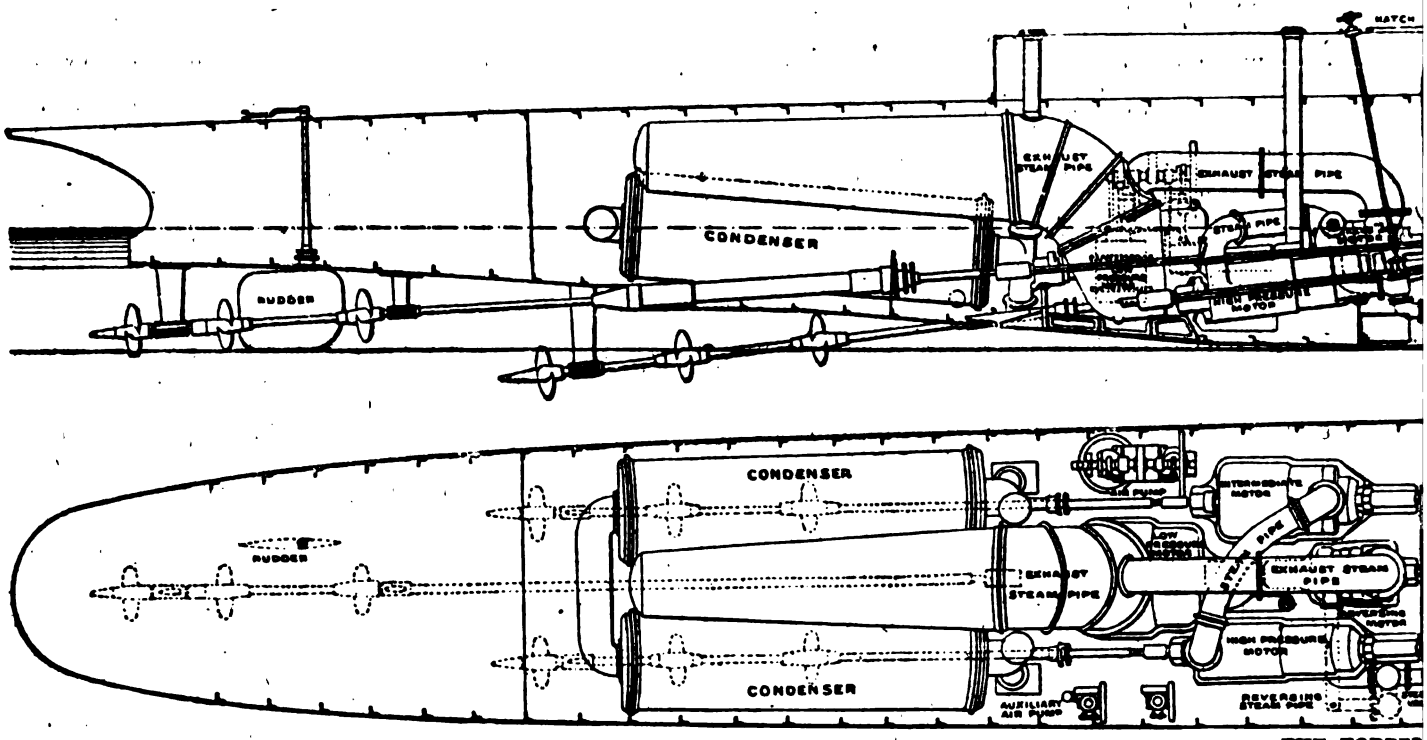
The compound steam turbine consists of a series of steam turbines set one after the other on the same axis, so that each turbine takes steam from the preceding one, and passes it on to the succeeding one. Each turbine of the set consists of a ring of fixed blades called guides fixed to the casing, and also a ring of moving blades attached to the shaft. The steam from the steam-pipe entering all round the shaft passes through the first set of guides, then through the first set of moving blades, then through the second set of guides, then through a second set of moving blades, and so on through the complete turbine-motor.

The blades are carefully shaped as in water-turbines, and the action of the steam in each turbine of the set is similar to that of water in the water-turbine.

Steam is, however, an expansive fluid, and though its action in each individual turbine is approximately as if the fluid was inelastic, yet a small increment of volume takes place at each passage through the blades, and the expansion going on at something like geometric ratio at each of the numerous successive turbines soon assumes large proportions. Ratios of expansion of fifty up to one hundred or even two hundred-fold are common in one single compound turbine of the condensing type—a notable feature in turbine practice being the high expansion ratios, and very large volumes can be economically dealt with without necessarily increasing the size and weight of the engine to any large extent, or what is perhaps more important and gives the turbine a special advantage over ordinary engines, is that practically no increase in frictional resistances is incurred by arranging for the extra expansion, and exceptional economy in steam is thereby realised.

The high speed of revolution diminishes not only the weight of the engines themselves in proportion to a given H.P., but also of the shafting, propellers, and supports, as well as of the hull. The total weight of machinery in vessels of the torpedo-boat or torpedo-boat destroyer class on the turbine system, will probably not exceed one-third that of ordinary engines of the same power.

The consumption of steam on recent trials of the *Turbinia* has been shown not to exceed 14½ lbs. per I.H.P. at full load, or considerably less than that of similar engines of the reciprocating class, so that the size and weight of the boilers, and also the amount of coal carried can be considerably reduced, and consequently the total displacement of the vessel to be propelled



THE TORPED
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will be largely reduced, so that with a given H.P. much greater speeds may be attained, or, on the othe r hand, heavier cargoes may be carried with a given consumption of coal per knot.

To these advantages must be added that the space occupied by the turbines is very much less than that occupied by ordinary engines thus increasing the capacity of the vessel, and also that the turbine machinery being near the bottom of the vessel, the centre of gravity is thereby lowered, and the stability of the vessel increased. Also, owing to their position (and even in the *Turbinia* with only 3 ft. draught), they lie almost wholly below the water-line—a matter of considerable importance in war vessels.

The almost total absence of vibration, owing to there being no reciprocating parts, admits of a diminution in the weight of the hull, and in fast vessels admits of a degree of comfort not hitherto attainable, and also in the case of warships, enables guns and torpedoes to be worked with ease and accuracy.

Another feature is that owing to the reduced size and weight of the shafts and propellers, this not only facilitates duplication and repair, and enables spare parts to be carried on board the vessel to an extent not hitherto practicable, but also, owing to the smaller diameter of the propellers, it admits of screw-propelled vessels being used for navigating shallower waters.

To summarize, the merits of the turbine system applied to marine propulsion appear to be:—

1) Greatly increased speed, owing to diminution of weight and smaller steam consumption.
(2) Increased carrying power of vessel.
(3) Increased economy in coal consumption.
(4) Increased facilities for navigating shallow wat ers.
(5) Increased stability of vessel.
(6) Reduced weight of machinery.
(7) Reduced cost of attendance on machinery.
(8) Reduced size and weight of screw-propellers and shafting.
(9) Absence of vibration.
(10) Lowered centre of gravity of machinery, and reduced risk in time of war.

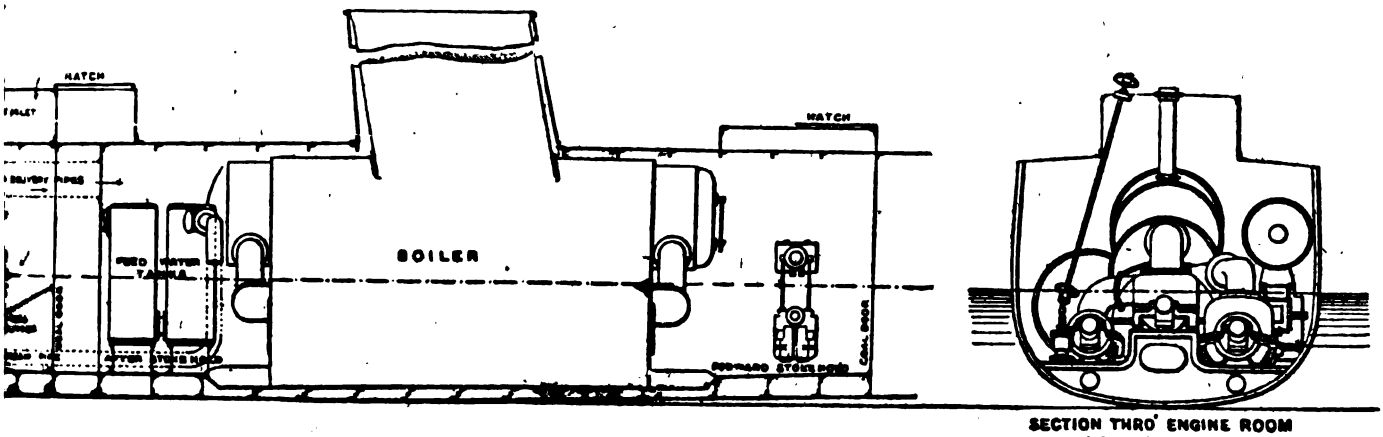
The first ship fitted with turbine engines has been the *Turbinia*. She is 100 ft. in length, 9 ft. beam, 3 ft. draught amidships, and 44½ tons displacement. She has three screw shafts, each directly driven by a compound steam turbine of the parallel flow type. The three turbines are in series, and the steam is expanded (at full power) from a pressure of 170 lbs. absolute, at which it reaches the motor to a pressure of 1 lb. absolute, at which it is condensed. The shafts are slightly inclined, and each carries three screws, making nine in all. The screws have a diameter of 18 in., and when running at full speed they make 2,200 revolutions per minute. Steam is supplied from a water-tube boiler, and the draught is forced by a fan, mounted on a prolongation of the low-pressure motor shaft, the advantage of this arrangement being that the draught is increased as the demand for steam increases, and also that the power to drive the fan is obtained directly from the main engines.

Up to the present the maximum mean speed attained has been 32¼ knots, as the mean of two consecutive runs on the measured mile. These runs were made after about four hours' steaming at other speeds, and the boat on the day of the trials had been fifteen days in the water. It is anticipated that on subsequent trials, after some alterations to the steam-pipe, still higher mean speeds will be obtained. As it stands, however, the I.H.P. realised is 2,100, and the consumption of feed-water per I.H.P. hour 14½ lbs., and the speed the fastest of any vessel irrespective of size. The weight of the main engines is 3 tons 13 cwt. Total weight of machinery including turbines and auxiliary engines, condenser and boiler, the propellers and shafts, the tanks and the water in boiler and hot well, 22 tons. Thus nearly 100 H.P. is developed per ton of machinery, and nearly 50 H.P. per ton of displacement of boat.

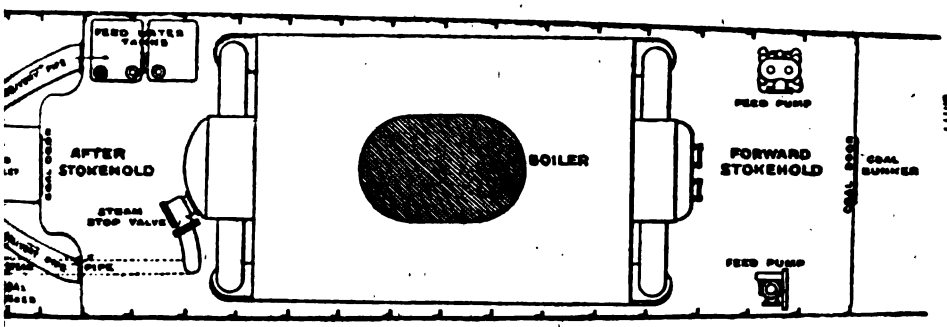
In the *Turbinia* the stresses on the boiler and machinery are, as far as possible, according to Board of Trade rules, and the scantlings of the hull are heavy for a boat of her size and class.

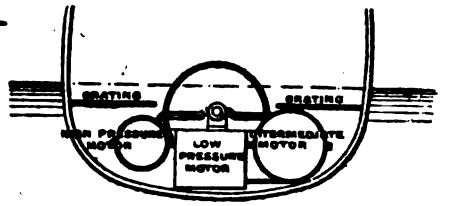
It is believed that when boats of 200 ft. in length and upwards are fitted with compound turbine motors, speeds of 35 to 40 knots may be easily obtained in vessels of the destroyer class, and it is also believed that the turbine will—in a lesser degree—enable higher speeds to be realized in all classes of passenger vessels.

The Chairman, Sir E. J. Reed, said that although Mr. Parsons had furnished them with details of his engines and vessel, the paper would justify a general discussion upon turbine engines or rotary engines by contrast with reciprocating engines.



SECTION THRO' ENGINE ROOM LOOKING AFT.





SECTION THRO' MOTORS

"TURBINIA."
ENGINEER.

Mr. Thornycroft said that he thought they would require further information before they could pass judgment upon the paper, and he would have liked Mr. Parsons to have given them some dynamo experiments where the power given off by the engines had been utilised. It was interesting to know that Mr. Parsons claimed that he had got increased economy due to the less leakage, and that with larger engines economy necessarily increased.

Professor Ewing said that he had recently had a short cruise in the *Turbinia*, and had made some observations as to speed, and also water consumption at various speeds. He was struck with the remarkable absence of crowding in the engine-room, the extreme ease with which the engines could be handled and set to work, and the absence of vibration. He found that the consumption of water was 29 lbs. at the highest speed per effective H.P. per hour. He would confess that he had been somewhat sceptical as to the application of steam turbines for marine propulsion, but he had come away absolutely converted.

Mr. Froude said it seemed to him that the question as to the advantages of rotary engines could not be answered positively in the present condition of their knowledge; but if they wanted very high speed relative to the dimensions of the boat, it appeared to him that Mr. Parsons had effected an achievement which had never before been dreamt of. He thought the diagrams of the turbines in the *Turbinia* showed an unusual arrangement of propellers, and they would have to consider, in applying the invention to ordinary ships, whether the conditions as to the efficiency would have to be largely departed from; and the first step was to see whether they could with such an engine get a good economy, combined with moderate revolutions.

Sir William White said it was obvious that a reciprocating engine did introduce vibration at certain speeds, no matter what care might be taken in balancing; but in recent engine design great care had been bestowed on balancing, and great steps made in reducing vibration. He wished publicly to say that what Mr. Parsons had arrived at, and described to them, was the result of years of effort, and that he did not know of any example of prosperous experiment and mercantile ability to surpass that of the production of the *Turbinia*. Amongst the things that might be said against Mr. Parsons' system was first of all the difficulty of going astern. Reciprocating engines, with all their faults, go equally well astern, and that, in the case of warships especially, was a point of enormous tactical advantage. As regards the speed, he agreed that it had been obtained for a very short period, and he thought if they could try one vessel first with this engine, and then with the reciprocating engine, they would arrive at a definite conclusion. He knew the late Mr. Froude was convinced that it was possible to gear down and with a very quick-running engine one might gear down, without excessive loss for such speeds of rotating of the shafting as would enable good efficiency to be obtained with the propellers. An illustration of this might be seen in the application of electro motors running at high speeds for driving machine tools that are going at low speeds, and in that application remarkable results are obtained as regards efficiency. He was confident Mr. Parsons had shown to engineers a way of advance; how far that advance might go time would show.

Mr. Parsons, in reply, said that the experiments as to the existence of the *Turbinia* were tried on the model which the late Mr. Froude invented, and he believed that their conclusions were substantially correct. It was difficult at that stage of the system to say how far it could be modified for ordinary ships; but at the present time it was certainly most suitable for high-speed ships. As Sir William White had said, gearing could be used, and all the difficulties of high-speed screws got over. In reference to reversing, there was a small reverse set of turbine blades on the centre shaft of the *Turbinia*, and they contemplated adding an additional brake, weighing about three-quarters of a ton, which would give her 10 to 12 knots astern.

The chairman congratulated Mr. Parsons in having produced a very excellent example of marine propulsion.

(To be continued.)

Messrs. F. A. Putz & Co., of London, have been appointed sole agents for the United Kingdom for the "Vereinigte Electricitaets Actien-Gesellschaft vormals B. Egger & Co.; in Vienna

Contractors to the Admiralty.—Messrs. John McInnes & Son, of 13, North John Street, Liverpool, the well-known manufacturers of anti-corrosive and anti-fouling compositions for ships' bottoms, have been placed on the Admiralty List.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from May 27th to June 24th, 1897 :—

Baron, R., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet.

Bartlett, Charles P. W. (probationary), assistant engineer to the *Blenheim*, to date June 8th,

Chase, John E., fleet engineer to the *Trafalgar*.

Crowley, Edward A. E., chief engineer to the *Vivid*, additional for the *Inconstant*, to date May 28th.

Ellis, E. F., staff engineer to the *Marathon*, to date June 8th.

Gaudin, E., engineer, has been specially promoted to the rank of chief engineer in Her Majesty's fleet.

Gay, William H., fleet engineer to the *Empress of India*.

Gibbs, Alfred W., chief engineer to the *Mildura*.

Heddy, Frederick G. (probationary), assistant engineer to the *Majestic*, to date June 8th.

Holgate, George S., engineer to the *Research*, to date June 11th.

Jones, Allen F. (probationary), assistant engineer to the *Resolution*, to date June 8th.

Jones, R. W., chief engineer to the *Bellona*, to date June 14th.

Lane, Charles, fleet engineer to the *President*, additional, as engineer overseer at Weymouth, to date May 28th.

McIndewar, A., engineer, R.N.R., to be senior engineer.

Oram, H. J., fleet engineer, has been specially promoted to the rank of inspector of machinery in Her Majesty's fleet.

Parsons, William G., assistant engineer to the *Rodney*.

Shrubsole, Percy J. (probationary), assistant engineer to the *Majestic*, undated.

Smith, Henry F., assistant engineer to the *Blonde*, to date June 10th.

Stuart, James J., staff engineer to the *Pembroke*, additional for Chatham Dockyard Reserve, to date June 12th.

Webber, James C. N. (probationary), assistant engineer to the *Hermione*, to date June 8th.

Wheater, Percy, engineer to the *Victory*, to date May 26th.

Wheater, Percy, engineer to the *Empress of India*, to date June 8th.

Wormald, George, assistant engineer to the *Widgeon*, to date June 10th.

Wright, John R. B., fleet engineer to the *Royal Sovereign*.

HOAR & BROWN'S HARDWOOD MARKET REPORT, JUNE 21st, 1897.

Teak.	Timber. Loads.	Planks. Loads.	Blocks. Loads.	Total. Loads.
Stock June 1st ...	5,736	1,492	24	7,252
Landings	2,631	696	—	3,327
	8,367	2,188	24	10,579
Deliveries	248	306	—	554
Stock June 21st ...	8,119	1,882	24	10,025

The deliveries for the first three weeks of the month only amounted to 554 loads, which is the smallest quantity yet recorded for any similar period this year. The deliveries for the first six months of 1897 amounted to 8,954 loads, against 10,670 loads during the same period of 1896. The tone of the market is at the present moment rather depressed, although prices are being maintained, but the volume of business is not quite so satisfactory. Stocks have been increased by the landing of a steamer cargo of 1,700 loads, and also several small shipments of inferior wood, attracted to European markets by the high prices now ruling. Should the shipments of this class continue they must result in loss to the shippers, as, while good wood is to be obtained, there is very little chance, even at reduced prices, of selling inferior timber.

The quantity of timber afloat is exceptionally small, and nearly the whole of the Burmah stock is sold for immediate consumption. The same remark applies to much of the Bangkok timber, which is gradually growing into greater favour on account of the improved specifications as compared with Burmah wood. In our opinion the present depressed tone of the market is not likely to continue. With the turn of the half-year it is fully anticipated there will be a brisk enquiry, as there are many shipbuilders and contractors who have not yet covered their engagements, which are of some considerable extent.

Planks have been in fair demand thoughout the month, and stocks are somewhat reduced, price showing no sign of weakness, but rather the reverse.

Mahogany.—The sales during June have been of considerable importance, and prices for sizeable wood in good condition remain stationary, but small and inferior logs show a reduction, the market for this class of wood being overstocked. The increase in the imports of *African* mahogany, and the ready sale with which it meets, goes to show that the wood is growing into favour. *Honduras.*—The stock of this class is small, and as the importation is now practically over until the autumn an advance in prices may be looked for. *Cuba.*—High figures are readily paid for decent logs and there is also keen competition for small wood.

American Walnut.—Logs are very slow of sale, prices for small wood being very weak. Large and good logs are very firm. *Planks and Boards.*—The value of the lower grades continues to recede; better qualities are steady.

Sequoia.—The demand is very inactive; prices continue stationary.

Kawrie Pine.—There has been a little better demand of late. Stocks being low, prices are very firm.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

WE are at the close of another month, one which will be recorded in history as a time of great rejoicing, fortunately not marred by the threatened strike which seemed at the end of May to be so close upon us. Wiser counsels have prevailed, and there is still every hope that the labour affairs will be amicably settled. Some trouble was expected when the machinist at the Pallion Works, Sunderland, resumed duty at his old place and on the old terms. Naturally there was much excitement amongst the men, the progressive section endeavouring to hold a meeting with the object of declaring an immediate renewal of the strike. This it is understood the men will not do, unless expressly ordered by their executive. So far, the machine question is settled, although the men are far from being satisfied to find the result what it is. On June 17th, the executive board of the Federation of Engineering Employers' Association met in the County Hotel, Carlisle, under the presidency of Sir Benjamin C. Brown. The meeting was a large and representative one. The chief business was the consideration of applications for affiliation. The employers in the Bolton district, who employ between them 5,000 and 6,000 men, were admitted after their claim had been discussed. Many other firms are making applications to enter the federation, in fact, the growth of the federation is marvellous. All the firms are pledged to the policy of the combination on the machine question and on the 48 hours' week. On June 19th a meeting of delegates of the Amalgamated Society of Engineers was held in the Viaduct Hotel, Carlisle, for the purpose of discussing the several labour questions, which are under discussion in the districts, and, if possible, formulating a plan of campaign which would be acceptable to the general body of members. The machine question and the eight-hours movement were discussed at great length, and a resolution was adopted, which will be laid before the council. The meeting was private, the nature of the resolution has not transpired, but it is stated that the discussion was of a very amicable character.

The Clydebank Shipbuilding and Engineering Co., Limited, have lately taken in an extensive tract of land to the west of the shipyard, for further additions to the resources of the establishment. Inside the present large area several new buildings have been erected within a recent date, but still more ample developments are contemplated in the westward direction.

There is every appearance of a hearty reception being given to the foreign guests attending the forthcoming conference of naval architects. The municipality of Glasgow have decided to entertain them to a conversazione in the magnificent City Chambers on the evening of July 13th, the day of their visit to the Clyde establishments—the Fairfield Works, and those of Messrs. Denny Brothers of Dumbarton, especially.

Messrs. The Cape Asbestos Co., Limited, have appointed

Mr. W. N. Thomson, 134, St. Vincent Street, Glasgow, their agent for Scotland and Ireland. The Liverpool address is 34, Castle Street.

Messrs. The Atlas Metal Co., Limited, have appointed Messrs. Peter Denniston & Co., shipowners, their sole agents for Glasgow, and the West and South-West of Scotland.

Messrs. The Ludlow Valve Manufacturing Co., of Troy, New York, have appointed Messrs. Cyril Dunderdale & Son, 119, St. Vincent Street, Glasgow, their agents for Scotland.

Messrs. Scott & Co., engineers and shipbuilders, Greenock, have contracted to build for Messrs. Butterfield & Co., London, six coasting steamers, of about 3,000 tons each—for the service of the China Steam Navigation Co., Limited, for which company the firm have previously constructed a large number of steamers. The vessels will be supplied with triple-expansion engines by the builders, and will be similar to the *Wu-hu* and sister ships constructed by Messrs. Scott & Co. last year.

Messrs. A. Rodger & Co., shipbuilders, Port-Glasgow, have received an order from the Ardrossan Harbour Co. to build a steel twin-screw tug of the following dimensions, viz. :—Length, 105 ft.; width, 21 ft. 6 in.; depth, 10 ft. 6 in. She is to be classed with the British Corporation Registry, and will be supplied with two sets of compound surface-condensing engines of 400 I.H.P. by Messrs. Ross & Duncan, Glasgow.

Messrs. A. & J. Inglis, shipbuilders, Pointhouse, Glasgow, have contracted to build and engine for Messrs. G. & J. Burns, a large and fast passenger screw steamship for their Royal Mail service between Scotland and Ireland. The new vessel is to be built to the classification and under the special survey of the British Corporation Registry, exclusively.

Messrs. David J. Dunlop & Co., engineers and shipbuilders, Port-Glasgow, have received an order to build and engine for the Anglo-American Oil Co. a steel screw steamer to carry oil in bulk. She will be 140 ft. in length, register 380 tons, and will be fitted with triple-expansion engines. This steamer, unlike those previously built for the same company, will not be engaged in the Transatlantic oil-carrying trade, but is for coasting purposes on the American seaboard.

Messrs. Gourlay Brothers & Co., shipbuilders, Dundee, have secured an order for two passenger steamers for the Finska Steamship Co., Finland. The vessels are to be fitted in the best possible style to meet the requirements of this company's trade, and will be of the following dimensions :—200 ft. long, 31 ft. 3 in. broad, and 23 ft. 9 in. deep. The speed to be obtained is about 14 knots. Special attention is given to the passenger accommodation, which is to be commodious.

Messrs. Barclay, Curle & Co., Whiteinch, Glasgow, have contracted to build for Messrs. G. & J. Burns, of Glasgow, a cargo steamer with all the latest improvements for the quick despatch of heavy goods and cargo in bulk, suitable for their Glasgow and Liverpool trade.

Messrs. The Grangemouth Dockyard Co. have secured an order from the Humber Coasting Co., Limited, to build a steamer for their London trade. Messrs. Walker, Henderson & Co., Glasgow, will supply the machinery. They are also building for an English firm a modern cargo steamer for the coal trade, to carry about 1,500 tons on a light draught, and to steam 10½ knots loaded, fitted with very large hatches for self-trimming.

Messrs. The Dundee Shipbuilders Co. have contracted to build a steam trawler 112 ft. in length, and of about 150 tons.

Messrs. The Fairfield Shipbuilding & Engineering Co., Limited, Govan, Glasgow, have secured an order to build a magnificent steam yacht for a member of the Rothschild family, from plans and specifications of Mr. G. L. Watson, of Glasgow, who has designed as many as seven of the vessels at present on hand in the Clyde Shipbuilding yards.

Messrs. Rankin & Blackmore, engineers, Greenock, have contracted to supply engines of 1,500 H.P., for a steamer of 6,000 tons dead weight carrying capacity, which is building by Messrs. Russell & Co., Port-Glasgow. The diameter of the high-pressure cylinder will be 24 in., the intermediate 40 in., and the low-pressure cylinder 64 in.

New Harbour.—The inaugural stone of the new harbour to be constructed at Hastings was laid on June 16th by the Marquis of Dufferin and Ava. When completed the harbour will inclose an area of 27 acres, and its construction will cost about £150,000.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—Now that the bulk of the Government work which was given to shipbuilding firms on the Tyne in the early part of last year, is about completed, or at all events is removed from the stocks, one or two of the leading yards have assumed an appearance of emptiness which is the reverse of cheerful. The fact, indeed, is being brought home to the most sceptical, that the state of exceptional prosperity, which has been attributed to the shipbuilding industry, is more apparent than real, and though the executive council of the Boiler-makers' and Iron-shipbuilders' Society have stated in their monthly report for June that sufficient orders are being booked to ensure a continuance of the present steady work, or in other words to make up for the contracts completed, it is known by those who are in a better position to judge accurately, that such is not the case. There were, approximately, 300,000 tons of new shipping launched from yards on the North East coast between January 1st and June 1st, in the present year; and there is but too much reason to believe that not half that quantity of tonnage was booked in the time. There has, of course, been some work secured, or the future outlook would be gloomy indeed; but notwithstanding the fact that wages have been advanced, and the prices of material raised, shipbuilders have had to be very accommodating in the matter of terms before they could bring to real business some of the enquiries that reached them. It is a somewhat curious fact that in spite of the circumstance of all the German yards being full of work, many of the best contracts that have reached this district are of German origin, and there can be no doubt entertained that the shipping interest of that country aims at taking a more prominent place in the oversea carrying trade of the world than it has hitherto been able to attain.

The trade union report, to which we have previously made reference, has some remarks on Government contracts which may be worth quoting. "We have," says the report, "a large quantity of work on hand for our own Government, as well as for other countries, and we, with some show of reason, set a high value upon our fleet. Every ship is home-built, from her fighting tops to her keel, though, it is asserted, that the stores, &c., cannot be recommended on the same ground. The fleet is, without doubt, a splendid monument to the skill and energy of the British artizan, but our own fleet is not the only one that has been largely created by his hands. We build ships for foreign nations with as much pleasure, speaking from the commercial point of view, as we build them for ourselves. This is one way in which our commercial spirit seems to be stronger than our patriotism. Other countries are alive to these facts and earn our thanks, as well as our good-will, by sending us orders for ships. No sensible man would assert that we should refuse this foreign trade. If we did, the foreigners would further develop shipbuilding in their own countries, and eventually would enter into active competition with us, not only in the construction of war vessels, but also in the building of merchant ships. Whatever the future may have in store for us, it is abundantly clear that our Navy must be maintained in its present position of supremacy; and that the efficiency of our shipbuilding establishments, and the men who work in them, must not be allowed to suffer deterioration." The report further says, "that certain shipbuilding firms which have within the past year or so been entrusted with Government contracts have lost largely owing to the dilatoriness of the Admiralty officials in furnishing plans, and the frequent structural alterations that have to be made—after work has been completed—without extra pay."

A rumour has been current in the district lately, that a Scotch syndicate had taken a piece of ground at Wallsend, with the view of making it the site of a large and up-to-date shipbuilding yard.

The advantages of the Tyne—situated as it is in the midst of coal fields and so near the iron and steel producing centres of the north—as a waterway peculiarly adapted to the requirements of shipbuilding, cannot be denied; yet, we must have something more tangible than mere words, in support of the statement referred to, before we feel disposed to place our faith in it.

We understand that Messrs. Armstrong, Whitworth & Co.

have been commissioned to build several warships of different types and displacements for countries in the southern and eastern quarters of the world, and it is believed that these additions to the contracts in hand will secure the company's shipbuilding establishments at Elswick and Walker against slackness for a very long time to come. The company have been further improving the productive facilities at both yards with a view to the attainment of still greater economy and speed in the carrying out of contracts.

The Palmer Co. are said to have booked one or two important mercantile contracts during the month, and their Jarrow establishment is already beginning to exhibit signs of increasing briskness. The company's steel works are very busy, and we are pleased to hear that their cycle making enterprise has turned out a complete success.

The yard of Messrs. Hawthorn, Leslie & Co., at Hebburn, has still an unusually bare appearance, but some orders of importance have been recently secured, and it will not be long till the yard resumes its normal appearance of activity. In the graving dock department business is brisk, and there are a number of vessels receiving the finishing touches in the river.

Messrs. Wigham Richardson & Co., who very recently launched an uncommonly fine steamer for the "Kosmos" Co., of Hamburg, have received an order for a vessel of large size from the "Hansa" Co. of the same port. The firm have built for both companies previously, and it is no small credit to them that their customers should, time after time, come back to them to renew their commissions. The last steamer built by the firm for the "Hansa" Co. was the fine steamer the *Neidenfels*, of 5,237 tons burden, and 500 H.P., which is now on the regular service between Hamburg and Calcutta. The activity at Messrs. Swan & Hunter's yards is fully maintained, and at Messrs. Stephenson's yard the staff of hands has within the past few weeks been very largely increased. At Messrs. Dobson's yard business is pretty good, and Messrs. Wood & Skinner's building berths are still fully occupied.

The Tyne Shipbuilding Co. have added substantially to their prospective work engagements, but the Palmer Co.'s Howden yard is still inoperative, and the establishment of Messrs. Edwards at the head of the Northumberland Docks is but a small way removed from that condition.

Messrs. John Readhead & Sons are said to have booked orders lately, and whatever may be said of other firms, there is scarcely a doubt that in this case the new work coming in is fully equal to the completed contracts going out. Slackness is a thing unknown at this establishment, and one ship follows another in each of the four large building berths, with scarcely varying regularity. In the repairing department full work is also almost constantly maintained, and the extensive equipment of plant that has been supplied in connection with the graving dock, is found none too large for requirements. Should the need arise for adding to the plant equipment, however, it may be safely assumed that the firm will not be long in supplying what is wanted.

The demand for fishing vessels seems to be well maintained, and several firms in this district have booked orders which will keep their yards going steadily up to the end of the year. Most of the repairing yards are well supplied with work, and very few vacancies exist at present upon the blocks of the graving docks. In the wood boat-building trade business doing is only moderate.

Engineering.—The agitation about the machine question has apparently subsided, but in its place we are threatened with one of a more serious character, in the shape of the demand for an eight-hour working day. We say, more serious, because the claim to exclusive control of any or all of the machines in the shops could never have been listened to by even the most democratic section of the employers; while the question of lessening the hours of labour has many advocates in all classes of society, and is much more likely to be entertained as a practical proposition. Should the claim for an eight-hour day become general throughout the country, it will probably be met by the employers proposing to abolish the old system of computing time by the day and week, and substituting for it an arrangement to value and pay for labour by the hour, which practice is already partially established and accepted. If payment by the hour, instead of by the day, comes to be the general usage, it is probable that the agitation for fewer working hours will share the fate of that connected with the machine question, and that there will only remain as a possible source of friction between employers and employed the question of the price of labour, which, in the eyes of most people, will appear to be quite enough.

The larger marine engine works on the Tyne continue to be fully employed, and nightwork is still very generally resorted to. At most of the works there are repair contracts in hand to supplement the new work, and in every case vessels are being fitted with machinery. At the Elswick Ordnance Works activity continues to exist, many of the departments being kept going night and day.

The locomotive works of Messrs. R. Stephenson & Co., and Messrs. Hawthorn Leslie & Co., are kept very busy on home and foreign orders, and the shops of the North-Eastern Railway Co. at Gateshead are also well employed.

The old and well-known works formerly occupied by the firm of Black & Hawthorn, but now in the hands of Messrs. Chapman & Furneaux, are now in full swing, the orders in hand consisting of locomotive engines of all descriptions, and other specialities.

In the iron foundries there is a large amount of work going on for marine engine and other contracts, and both brass works and copper works are kept busy. Forges also are well employed, and makers of ventilators and other kinds of sheet iron work for steamers, are kept steadily going. In electrical engineering the state of business is good, but competition for work is keen.

THE WEAR.

Shipbuilding.—At the North Sands yard (Messrs. J. L. Thompson & Sons) there was launched on June 3rd, a finely designed passenger steamer for Japanese owners, and the vacated berth was immediately utilised for the putting down of another large vessel which, it is understood, is also for foreign (though not Japanese) owners. The other four berths in the yard are also occupied with vessels of large size, and it will therefore be no exaggeration to say, that the yard is as busy as possible. The firm are fitting out at their Manors Quay Works, the fine steamer *Ovidia*, which has been specially built for employment in the timber trade, and has a very elaborate electric lighting installation by the Sunderland Forge and Engineering Co., Limited.

Sir James Laing also launched this month a handsome Japanese boat, of similar dimensions to that launched by Messrs. Thompson & Sons, and for the same owners. This eminent builder also launched a large vessel for the British India Steam Navigation Co., and there are still on the stocks some half dozen vessels of special and important types. The British India boat referred to was built on a piece of ground which, some time ago, was incorpopated with the Laing yards, and which possesses the advantages of exceptionally good launching room.

Messrs. Robert Thompson & Sons have launched a vessel this month, and have put down another, so that there are still three vessels on the stocks. At Messrs. Pickersgill's a trio of empty berths are still to be seen, and at Messrs. Osborne & Graham's there appears to be very little doing. Messrs. Priestman, however, are well provided with work, and at Messrs. Short Brothers it is perhaps not too much to say that there is a superabundance. Messrs. Doxford launched early in this month the third of the vessels ordered from them at the end of last year, by the owners of the Clan line; and this firm also are understood to have a large amount of work in reserve.

The Sunderland Shipbuilding Co. launched during the month a fast passenger steamer for French owners, which, besides being equipped with powerful main engines by the North-Eastern Marine Engineering Co., has auxiliary machinery of up-to-date type, and a complete electric lighting installation by Messrs. Siemen Bros., of Newcastle. Messrs. Bartram & Sons also launched a vessel, and have placed the keel for another in the vacated berth; and at Messrs. Austin's a similiar operation was performed. The latter firm have a large amount of repair work in hand, in addition to the new work, and are finding it necessary to keep a considerable proportion of the hands on night work.

The large and splendidly equipped graving docks belonging to the Wear Commissioners, and situated almost at the entrance to the river, have not been vacant—excepting for brief spaces—during the past month, which circumstance points to the conclusion that the possession of such means for carrying out repairs or for examining the bottoms of vessels, is of inestimable advantage to the port.

Engineering.—At the Southwick Engine Works (Messrs. George Clark, Limited) business is extremely brisk, and night shift is maintained in all departments. We are informed that at one ironfounding establishment on the river there are castings in hand for five engines to be built at the Southwick Works. Messrs. Doxford's engine works are also actively employed, and

the same may be said of the Palmer's Hill Works and the North Eastern Works, South Dock. Messrs. John Lynn & Co. are keeping very busy in their engineering shops on such work as steering gears, steam winches, &c., and in their new foundry a large amount of work is being turned out weekly.

The aluminium; and brass and copper works of Mr. Wm. Mills, Monkwearmouth, continue to be fully supplied with orders, the demand for aluminium products being particularly active.

The Bloomfield Engine Works (Mr. A. A. Rickaby) are kept in steady operation on orders for well-known specialities, and at most of the forges a satisfactory state of business still exists.

The Hartlepools.—Some new shipbuilding orders have been received by the firms at this centre, and the outlook for the remainder of the year has somewhat improved. A strike of platers' helpers at Messrs. Furness & Withy's yard, in reference to the payment of "lying time" previous to the commencement of the Jubilee holiday, has caused some inconvenience. At the local engineering works business continues good, and at the docks work is brisk.

Stockton.—Here also some further orders have been received by shipbuilders, and considerable briskness is to be noted at two of the yards. Engineering works are well employed, and steel and iron works are busy. In the boiler and bridge building works, business continues extremely active.

Middlesbro'.—The firm of Sir Raylton Dixon & Co. has been converted into a limited liability company. This is done merely as a matter of convenience, and will involve practically no change in ownership or management. The shipyard is well supplied with work. In foundries and engine shops business is still good, and steel works are as busy as possible. At the docks considerable activity exists.

Darlington.—The Darlington Forge Co. has been entrusted with some very important contracts for forgings required in connection with the equipment of large liners building on the Clyde and at Belfast. The prospect of brisk work at the establishment for some time to come is consequently assured.

Consett.—The blast furnace men at the Consett Iron Co.'s Works have declared their intention to strike work on July 2nd, unless the concession of an eight hours' working day, or the abolition of Sunday labour, is granted in the meantime.

THE MERSEY.

(From our own Correspondent.)

GENERALLY a very satisfactory tone prevails throughout the engineering and iron trades of this district. The holiday stoppages have of course interfered to some extent with operations at engineering establishments, but as a rule they have restarted full of work for some time ahead. Machine tool makers continue well engaged, especially for marine requirements; machinists, except some of the textile branches, are kept pretty fully employed; boiler-makers, locomotive and stationary engine builders are also well off for orders. There is also a good deal of work on hand in the shipbuilding yards, and generally the outlook, so far as trade itself is concerned, is a favourable one.

Messrs. Laird Brothers have, during the month, completed a submarine mining steamer for the Argentine Federation. This vessel is 70 ft. long, with a width of 17 ft.; draught of water, 5 ft. to 6 ft., and a speed of 10 knots. She is very completely equipped with appliances for stowing and laying out a large number of mines, and has passed through a very satisfactory trial. The torpedo destroyer *Earnest* and *Griffon*, have in official trials, fulfilled the Admiralty requirements, in which a speed of 30 knots is an essential feature, and the *Wolf* has been successfully launched. On the 18th ult. the *Connaught*, which is the last of the four twin screw steamers built to the order of the City of Dublin Steam Packet Co., was launched, and, as is always the case at Messrs. Laird's yard, the function was very successful. The sister ships, *Ulster*, *Munster*, and *Leinster* are already on the station between Holyhead and Kingstown, and on their official cross-channel trips have exceeded the contract speed.

The usual monthly employment returns of the principal engineering trade unions indicate a considerable reduction in the unemployed list. The Amalgamated Society of Engineers has now only 1¾ per cent. on donation, as compared with over 3 per cent last month, and the Machine Workers' Association only ¾ per cent. as against 3 per cent., this large decrease being due for the most part to the settlement of the Oldham strike. In the Manchester district the Amalgamated Engineers have 1½ and the Machine Workers only ¾ per cent. on donation, which fully bears out what has been stated above as to the state of trade in this district. The Steam Engine Makers' Society has not more than ¾ per cent. of out-of-work support, which represents a slight decrease. Reports as to the condition of trade continue very satisfactory; practically all the Lancashire districts reporting it as good, whilst in other centres activity is generally maintained, and there is a prospect of steady employment in the engineering trade for some time to come, provided no strike or lock-out arises as a result of the present position as regards labour matters.

With regard to the machine labour question, which during the past month has practically remained in abeyance, Mr. Barnes, the general secretary of the Amalgamated Society of Engineers, states, in the monthly journal of the organization, that although the members were greatly incensed at the action taken by the employers in setting a man to work on the machine at the Pallion Forge at under the district rate, they had yet been restrained and induced to remain at work. There was a time and method of bringing the matter to an issue more conducive to a satisfactory result, and the society relied upon the discipline and patience of the members while they brought into line all the factors which would contribute to a satisfactory result. The man now working the disputed machine referred to by Mr. Barnes is, we understand, an apprentice, and not a member of the Machine Workers' Society, as has frequently been stated in the Press. During the month the machine labour question has also come into prominence at Bolton, and at the L. & Y. Railway Carriage Works at Newton Heath; in both cases the question is still pending. With regard to the eight hours' movement in the London district, the position has been rendered more serious by the amalgamation of the London Employers' Association with the general Federation, and the members are fully determined to resist the demand put forward by the men. The workmen, judging from some of Mr. Barnes' comments on the matter, are equally determined, and a severe struggle on the question is not at all improbable.

Messrs. Holden & Brook have recently moved to new and modernly equipped works at Gorton, Manchester, their Salford establishment having been altogether inadequate to cope with their increasing business. The new works will enable the firm to more than treble their previous producing capacity. The main shop is about 60 by 40 yards, and is a well-lighted building floored with wood blocks on concrete foundations. In addition to the large machine shop the works include brass foundry, pattern shops, drawing offices, and a special department for the manufacture of their steam driers and ejectors. The works have been fitted with new plant, including a number of tools of special design, one novelty being an ingeniously constructed screwing lathe, so arranged that it can be reversed without overhead reversing motion. With regard to the firm's patent steam driers, which are constructed on a new principle, the firm are very busy in these, especially for electric light work. They are also very full of orders for ejectors, including one for 200 of their compound type, which they are sending out to India.

A new electric cure is being introduced by Messrs. W. T. Glover & Co., Salford, Manchester, for curing the vulcanised joints in electric light cables. This cure consists of two parts, the upper portion being taken off to allow the cable to be inserted, and then firmly clamped down. A thermometer is attached to register the required temperature. The current is taken on for half-an-hour or so, according to the size of the joint. This cure is altogether a very handy arrangement, and there is of course no risk of fire. It is readily portable from one point to another, and the temperature is maintained with much greater exactitude than is possible with a fire-heated cure. All that is necessary is to connect a flexible wire to the current supply, when the cure can be raised to the proper temperature, and the joint thoroughly cured in a comparatively short space of time. The joint, if proper care is taken, will be as substantial as the rest of the cable. The firm also make an electric soldering iron, which can be used in any place where the electric current is available. This soldering iron is a much more effective and convenient article than the ordinary gas-heated appliances, and can be used at a considerable distance from the current supply by connecting a wire to it.

Mr. W. Ward, of the "Nobro" depôt, Macdonald's Buildings,

Manchester, is introducing an improved form of the "Nobro" patent portable fire engine, which is particularly suitable for use on steamers, yachts, &c. This engine, which is applicable both for fire extinguishing and cleansing requirements, can be readily moved about to any desired point, and is worked by simply operating a series of pedals, the whole weight of the operator supplying the motive power, whilst both hands are at liberty to direct the flow of water. The improved design is much more substantially constructed than previous patterns, and will throw water 50 ft. at 80 lbs. pressure.

A strong tone is maintained in the iron market here. No great weight of business has been put through, the holidays having interfered with business to a large extent, but prices generally are very firm, with makers in some cases showing a disposition to hold out for some advance upon recent rates, and outside brands have again moved upwards about 6d. to 1s. per ton. Local and district brands are without quotable change, but makers are indifferent about booking orders at present quotations. Delivered Manchester the average prices are 46s. 6d. for forge to 48s. 6d. for foundry Lancashire, less 2½; 44s. for forge, to 45s. 6d. for foundry Lincolnshire, and 47s. to 47s. 6d. for Derbyshire foundry net cash. In outside brands offering here ordinary foundry Middlesbrough is not obtainable under 49s. 10d. to 50s. 4d. net, delivered by rail Manchester, Scotch iron is quoted 47s. 6d. to 47s. 9d. at the Lancashire ports, and 49s. 9d. to 50s. at the Manchester Docks, for Eglinton and Glengarnock, net prompt cash.

In finished iron there is no material change to notice. Prices for bars have been easing down somewhat, but with the close makers are showing rather more firmness, and although Lancashire bars could still be bought at £5 15s. to £5. 17s. 6d., the minimum figure would only be taken in very special cases. North Staffordshire qualities average £6 to £6 2s. 6d., although £6 5s. is quoted for some of the principal brands. Sheets remain at £7 to £7 2s. 6d., and hoops £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, with 2s. 6d. less shipment.

In the steel trade the tone is firmer, if anything, but quoted rates are without appreciable alteration. Ordinary foundry hematites still average about 57s. 6d. less 2½; steel billets, £4 10s. net; bars, £6 3s. 6d. to £6 5s., and boiler plates about £6 5s., delivered in this district.

Business is active in the metal market, and prices are steady at list rates, which for delivery in this district remain as under:—Solid drawn brass tubes, 7¼d.; solid drawn brass surface condenser tubes, 8¾d.; solid drawn copper tubes, 8¼d.; brazed copper tubes, 8¼d.; brazed brass tubes, 8¼d., brass wire, 6¼d.; copper wire, 7¼d.; and rolled brass 6d. per lb.

In the timber trade deliveries have been fair, but stocks are ample, and buyers, owing to reported increased imports, which, however, may not be as large as anticipated, are disposed to act with great caution. Teak is coming forward much too freely, and the stock is rapidly accumulating, with the result that a depressed tone prevails and prices are easier. Only one cargo of greenheart has arrived, but the demand is quiet, with prices unchanged.

With the stoppage of the pits owing to the Whitsuntide and Jubilee holidays the usual course of business in the coal trade has necessarily been considerably interfered with. Generally a fairly steady tone has been maintained during the month, but there are now signs of some falling off as regards round coals. House-fire qualities are only in limited request, and with supplies plentiful there is a tendency to ease down on current rates, but there is still no really quoted giving way. Steam and forge coals are in fair demand, but supplies are ample for all requirements, and prices not more than maintained at late rates. Engine fuel meets with a ready sale, and prices are firm at recent quotations. At the pit mouth best Wigan only averages 10s.; Pemberton four foot, and seconds Arley, 8s. to 8s. 6d.; common house-coal, 6s. 6d. to 7s.; steam and forge coal, 6s. to 6s. 6d.; engine fuel, 3s. 3d. to 3s. 6d. for common slack; 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for best sorts.

For shipment there has been a fair business doing, and prices have shown an upward move, ordinary steam coal averaging 7s. 9d. to 8s. 3d., delivered Mersey ports.

BELFAST TRADE NOTES.

(From our own Correspondent.)

BUSINESS still continues very brisk in the shipbuilding and engineering and other allied trades in Belfast, a large amount of work remaining on hand. It is understood also that there is no lack of new work coming forward. Of course, it is a matter of some difficulty to ascertain exactly the position of affairs in regard to new orders, as the large majority of the orders placed here are for what might be termed private clients. For good reasons, these orders are not made public until work is actually commenced upon the vessels in question.

This month there happens to be only one launch to mention, but the large dimensions of the vessel will compensate for the lack of numbers. This is the twin-screw steamer *Briton*, for the Union Mail Steamship Co., and will, when completed, be the largest and best equipped of their already fine fleet. The launch, besides being interesting from the ordinary point of view, was made doubly so from the fact of its taking place at a date so near the Diamond Jubilee, and for this reason was made the occasion for a most imposing ceremony in the yard, followed in due course by a sumptuous luncheon in the Ulster Hall, which was temporarily transformed by means of floral and other decorations into a magnificent banqueting hall.

The new steamer is the ninth vessel which Messrs. Harland & Wolff have constructed for this enterprising company, and is intended for mail and passenger service to and from the Cape. Her dimensions are :—Length 530 ft. by 60 ft. beam by 40 ft. deep, with a gross tonnage of about 10,300 tons. The *Briton* has been designed very much on the lines of the *Norman*, which has proved herself so successful in the Cape trade, but her extra seven feet of beam has enabled the staterooms to be considerably enlarged, making them exceptionally large, airy, and comfortable. Accommodation has been arranged for nearly 300 first-class passengers on the bridge, upper and main decks, while 200 second-class berths have been provided on the main deck. A noteworthy feature in the design is the provision for about 120 third-class passengers in the poop, this being arranged in rooms containing eight berths each, while there is still open steerage accommodation for 300 persons. It will thus be seen that the vessel will carry four different classes of passengers, having separate galleys and pantries for each class. The various saloons, libraries, etc., will be furnished in elegant style, while the promenade decks are of exceptional length. The officers' quarters are conveniently situated on the bridge deck.

The *Briton* will be supplied by her builders with two sets of triple-expansion engines of great power and calculated to drive the vessel at a high rate of speed. The launch, which took place without a hitch, was witnessed by a very large number of influential visitors, including Sir Francis Evans, chairman of the company, and Lady Evans; Mr. W. M. Farmer, deputy chairman, and Mrs. Farmer, etc., and by representatives of the press from all parts of Great Britain, a number being from South African papers. As already mentioned a sumptuous luncheon was served after the launch to the numerous visitors present. After lunch a number of toasts were proposed and heartily honoured.

In proposing the toasts of the Queen, and of South Africa, and Success to the Union Steamship Co., Mr. W. J. Pirrie, Lord Mayor, ably commented upon the striking advances that have been made in naval architecture and marine engineering during the Queen's truly record reign, and brought home with great force how much of the development is due to colonial enterprise and *vice versa*.

Among the new vessels which have left this port during the month of June may be mentioned the R.M.S. *Oravia*, for the Pacific Steam Navigation Co. This large steamer, which is intended for the company's mail service between Liverpool and South America, is 420 ft. in length, 48 ft. 6 in. breadth, and has a gross tonnage of about 5,500. She is fitted with twin-screws, propelled by two sets of triple-expansion engines each of about 2,100 I.H.P. The propellers are of manganese bronze. The ship has been built under Board of Trade passenger certificate as a first-class passenger and mail steamer, while the cargo arrangements are on the most approved modern lines.

The internal decorations are in excellent taste, the woodwork of the saloon being oak and teak, very handsomely carved in deep relief. The smoking room is also of oak with teak furniture, while the ladies' room is in sycamore and walnut, with all the necessary lounges and easy chairs and writing tables. After

adjusting compasses, the vessel ran a successful trial trip, and left for the Clyde. A large and representative company were on board during the trial.

Messrs. Workman, Clark & Co., Limited, also despatched the large steel screw steamer *City of Sparta* during the month. This vessel, which is the first of two on order for the well-known City Line of Glasgow, has been specially designed for the City line trade, being a most modern cargo carrier in every respect. Exceptional facilities for handling cargo have been provided. The dimensions are: Length, 430 ft.; breadth, 50 ft.; depth, 31 ft. 6 in., with a gross tonnage of 5,200.

It should also be mentioned that the s.s. *Kamakura Maru*, built by Messrs. Workman, Clark & Co., Limited, for the Nippon Yusen Kaisha, of Japan, and engined by Messrs. Barclay, Curle & Co., Limited, Glasgow, has been completed. This vessel left Glasgow early in June for Middlesborough, to load for Japan, and on the run round gave entire satisfaction, accomplishing the distance in several hours less time than any of the other similar vessels for this company.

It is currently reported that the master engineers have offered and the men have accepted one shilling per week advance on their wages provided that no more advances be asked for a year to come—this brings Belfast engineers' wages up to wages paid in London and other ports.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—There is nothing much that is new to report in reference to the shipbuilding and marine engineering trades. The great feature of the business at the moment is the scarcity of new orders. The Barrow yard has capacity on its slipway for the keels of over twenty big vessels alongside of each other, and at present there are only three vessels in course of construction—H.M. first-class cruiser *Amphitrite*, the Fleetwood and Belfast twin-screw high-speed passenger steamer *Duke of Cornwall*, and a sludge-boat for the Manchester Corporation. There are, perhaps, three reasons why the Barrow yard has not lately secured any new orders. In the first place the demand for new tonnage generally has been quiet, and there has been corresponding keen competition for the few orders offering, with the result that the best builders have not been able to see their way to any profit on the ships ordered. In the second place, the works at Barrow have been in a state of transition, and attention has not consequently been so keenly observed as perhaps was necessary when the market was so poor and competition for orders so keen; and thirdly, because important new work has been under consideration, and in view of this builders have not cared to incur responsibilities as to delivery which might be difficult of realisation in view of immediate future possibilities and probabilities. In the meantime very good progress has been made in the work in hand. H.M.S. *Niobe* is in a forward state in every feature of her construction save her boilers. These have been kept back because of certain experiments that have been progressing as to the working of economisers in the uptake from the boilers. These experiments, which will also affect the construction of the two similar type of cruisers building at the Fairfield and Clydebank works have been conducted at Barrow under the direction and special attention of Mr. Durston, now Sir A. J. Durston, and they have proved so successful that it is whispered that they will ultimately be adopted by the Admiralty in the *Powerful* and *Terrible*, as well as in all other cruisers and battleships in which the Belleville boiler is adopted. In the meantime, however, these experiments have led to considerable delay in the completion of the first-class cruisers now under construction, but even yet it is possible to complete deliveries this year, as immediately the tests are finally completed the rest of the boilers will be speedily put together, all the material required being ready, and the time necessary to do the work being comparatively small. The four torpedo-boat destroyers built at Barrow are all ready for their trials. Some are in the experimental stage, and others are ready almost for their final trials. They are all 30-knotters, fitted with the Thornycroft boilers. A few technical difficulties have been met with and overcome, and a prospect of their being completed at an early date is now afforded. The *Amphitrite* is progressing very well in construction and will probably be ready for launching either at the end of this year or at the beginning of next. The experiments with the *Niobe's* boilers will simplify the work in this department with the *Amphitrite's* boilers. During the month the Great Western Railway Co.'s new steamer *Roebuck* has passed through a very successful trial, as reported in another column, and easily accomplished her required speed of 20 knots, proving herself the fastest passenger steamer employed on the channel service. Her sister ship, the *Reindeer*, has also since passed through her trials satisfactorily, and has gone to the Great Western Co.'s depot at Milford preparatory to going on the company's Channel Island service. Both these steamers have given the greatest satisfaction to the Great Western Co., as also have the repairs and overhaul of the *Ibex*, which, it will be remembered, met with an accident when on service some months ago, and which is now again on her station. Messrs. Vickers, Sons & Co. have now taken formal possession of the Naval Construction and Armaments Co.'s works at Barrow, and in the future the concern will be worked under the name of the Sheffield firm, with the sub-head of "Naval Construction Works, Barrow-in-Furness." It is already known that the chief scheme of the new owners is to employ these works in association with the Sheffield works for the building of war vessels of every type, and utilising their own make of armour plates and their own manufacture of guns. It is in this respect that the new owners expect to impart increased activity to the Barrow Works, and certainly the scheme before them is one likely to be successfully carried out, because there is always a demand for modern warships for some nation or other, even in times of peace, and if this work is undertaken by a firm of capitalists who are to the front in their own trade of armour-plate makers, and are going to be in the first rank of gun-makers, and now to the fore in acquiring a modern shipbuilding yard which probably has not its equal in the world for size, modern equipment and general facilities of production, much may be expected in the future. This is all the more important in view of the fact that Messrs. Vickers are men of known commercial standing, and of characteristic enterprise. At any rate, hopes are entertained in Barrow that the change of ownership in its great shipyard will mean greater activity and more regularity of employment, and already signs that this will be the fact are evidencing themselves.

Shipbuilding Material.—A further demand for steel shipbuilding material is reported, and local makers are already busier on all classes of produce, and particularly steel plates and heavy ship castings. It is evident there is a disposition in Barrow to increase the number and character of steel products required in shipbuilding and engineering work generally, with the view of making the district more and more dependent on itself, and all the more capable of competing successfully in the open markets. Heavy ship plates are quoted at £5 per ton. Other articles are firm at late rates.

The Hematite Trade.—There is increased firmness and activity in the hematite pig-iron trade, and business is being done at fuller prices—50s. to 52s. 6d. per ton is the quotation for parcels of mixed Bessemer, Nos. net f.o.b., while warrant iron is quoted at 49s., sellers net cash, 48s. 11½d. buyers. Stocks of warrant iron have been further reduced, and they now stand at about 65,000 tons less than at the beginning of the year, but they still total up to over 220,000 tons of metal.

Shipping.—The shipping trade is busy and exports of pig-iron especially are large. They show a great increase on the year, while steel shipments are not far below those of last year, which were heavy.

Refrigerating Machinery.—There has been a very marked increase latterly in the number of ships that are fitted with refrigerating machinery, not only for cargo purposes, but for the preservation of provisions. The Linde British Refrigeration Co., Limited, state that about 40 ships are now being fitted with machines on their system, making a total number of over 3,100 machines, about 450 of which are for marine use. The vessels now being fitted up include eight cargo ships to be used in the new Canadian service, 15 vessels for the Nippon Yusen Kaisha and other Japanese lines, several vessels of the British Navy, and a number of passenger boats, amongst others the *Kaiser Wilhelm der Grosse*, the largest vessel now afloat. In this country large installations for ice making and cold storage are being erected at Bristol, London, Glasgow, and many other places. The 100-ton Linde Ice Factory at Grimsby is now in full operation, and is claimed to be the most economical ice factory in existence.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—ENGLISH.

Clara.—On May 4th a steel sailing schooner of about 300 tons, named the *Clara*, was launched at South Shields for the Goole and Hull Steam Towage Co., Goole.

Swift.—On May 4th a steel steam ketch of about 245 tons, named the *Swift*, was launched at Newcastle for Messrs. Kelsall Brothers & Beeching, Limited, Fleetwood.

Ashot Ergat.—On May 13th a steel steam schooner, named the *Ashot Ergat*, was launched at Newcastle. Port of registry, Astrachan.

Hopper Barges.—On May 14th Messrs. W. Harkess & Co. launched at Middlesbrough for the North-Eastern Railway Co., two iron hopper barges. Length, 80 ft.; breadth, 25 ft.; depth, 9½ ft. They are to carry 200 tons on 7½ ft.

Ile de la Reunion.—On May 15th Sir William Laing launched at Sunderland for the La Cie. Havraise Peninsulaire de Nav. a Vapeur, the steel screw steamer *Ile de la Reunion*. She is 3,700 tons gross, and 5,800 tons deadweight. She is to class 100 A1.

Montcalm.—On May 17th a steamer was launched from the yard of Palmer's Shipbuilding and Iron Co., Limited, at Jarrow-on-Tyne, the first of two sister ships building to the order of Messrs. Elder, Dempster & Co., of Liverpool. Her dimensions are:—445 ft. length between perpendiculars, by 52 ft. beam, by 30 ft. 10 in. moulded depth. She is rigged as a four-masted fore and aft schooner, and is to carry about 8,000 tons deadweight on a moderate draught of water. She has been specially designed for the cattle and general cargo trade, and is built to class 100 A1 Lloyd's, having a continuous cattle-shelter deck fitted all fore and aft. The machinery is also by the Palmer Co., under the inspection of Mr. Lees, the engines being single-screw triple-expansion cylinders, 30 in., 50 in., and 81½ in., by 54-in. stroke, steam being supplied by three large double-ended boilers, 180 lbs. working pressure. The propeller blades are of bronze, and the vessel will be furnished with all the latest improvements. She was christened the *Montcalm* by Mrs. John Evans, wife of Captain John Evans, under whose personal supervision, as representing the owners, the vessel has been constructed.

Carroo.—On May 17th a steel steam smack of about 180 tons, named the *Carroo*, was launched at North Shields for the Adelaide Steamship Co., Port Adelaide.

Imperial Queen.—On May 19th an iron steam ketch of about 167 tons, named the *Imperial Queen*, was launched at Hull for Messrs. C. Hellyer & Co., Limited, Hull.

Pigeon.—On May 20th Messrs. Edwards Brothers, of North Shields, launched for Messrs. Kelsall Brothers & Beeching, Limited, the steam trawler *Pigeon*. She is of 142 tons.

Steel Screw Steamer.—On May 20th Messrs. R. Craggs & Sons launched at Middlesbrough, to the order of Messrs. Pile & Co., of London, a steel screw steamer of the following dimensions:—Length, 220 ft.; breadth, 33 ft.; depth, moulded, 16 ft. 3 in.; built to class 100 A1 at Lloyd's. She will be fitted with triple-expansion engines by Messrs. M'Coll & Pollock, of Sunderland.

Albina.—On May 28th a small steel-screw steamer was launched by Messrs. Wigham Richardson & Co. from their Neptune shipyard, Newcastle-on-Tyne, for the service of the Dutch Colonial Government in Dutch Guiana. The vessel is about 124 ft. in length by 22 ft. beam, and will have a very light draught of water to enable her to ascend the rivers on her station. She will have very comfortable accommodation for a good number of passengers, due regard having been paid to the tropical character of her service to render travelling by her most comfortable. The propelling machinery and boilers are also being constructed by Messrs. Wigham Richardson & Co., and are designed to drive the vessel at a high speed. As the vessel left the ways she was named the *Albina*, the christening ceremony being gracefully performed by Miss Gundred Haig, daughter of Major Haig, R.E. The Dutch Colonial Government were represented at the launch by Mr. J. de Bruyn Kops, naval architect, of the Hague.

Helios.—On May 29th Messrs. Wood, Skinner & Co. launched from their shipbuilding yard at Bill Quay-on-Tyne, a handsome steel screw steamer, built by them to the order of Messrs. Bruusgaard, Kjosterud & Co., of Dram, Norway. Her principal dimensions are as follows, viz.:—Length over all, 248 ft.; breadth, 35 ft.; depth, moulded, 20 ft. 6 in. She has been built under special survey to Norske Veritas highest class, 1 A1*, and is of the single-deck type, with bridge and topgallant forecastle, and will be rigged as a fore-and-aft schooner, and fitted with telescopic topmasts. The vessel has water ballast in the cellular double bottom, all fore-and-aft, and also in the after peak. The saloon, captain's accommodation, and spare berths, are in a large house on bridge deck amidships, with chart-room and flying bridge above, the officers' accommodation being inside houses on main deck, while the crew are berthed in topgallant forecastle. The ship is fitted with every modern appliance for facilitating the rapid loading and discharging of cargo. Her engines, which are of the improved triple-expansion type, will be fitted by the North-Eastern Marine Engineering Co., Limited, at their Wallsend works. The diameter of the three cylinders are 18½ in., 30 in., and 49 in. respectively, and the length of stroke 33 in., steam being supplied by a large steel boiler having a working pressure of 160 lbs. The ship and engines have been superintended during construction by Mr. Norman Burnett, of Newcastle, the inspector for the owners. As the vessel left the ways she was christened *Helios* by Miss Maggie Skinner, of South Shields. When completed the steamer will be commanded by Captain Johan G. Salvesen, of Dram.

Iron Lighter.—On May 29th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, to the order of Messrs. Thos. Wilson, Sons, & Co., Limited, of Hull, an iron lighter, of the following dimensions:—Length, over all, 70 ft.; breadth, moulded, 17 ft. 6 in.; depth, moulded, 8 ft. 6 in., with a total carrying capacity of 180 tons. She is the eleventh vessel built by Mr. Joseph Scarr for them.

Dacia.—On May 31st there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, to the order of Mr. W. T. Marshall, of Hull, an iron keel of the following dimensions:—Length, over-all, 61 ft. 6 in.; beam, extreme, 15 ft. 8 in.; depth extreme in midships, 7 ft. 9 in., with total carrying capacity of 130 tons. She was christened the *Dacia* by Miss Marshall, daughter of the owner.

Adana.—On May 31st Palmer's Shipbuilding Co. launched at Jarrow-on-Tyne, for Mr. J. M. Wood, the steel screw steamer *Adana*, a vessel of about 3,500 tons gross. She is to receive the highest class in Lloyd's Register.

Plover.—On May 31st Messrs. Edwards Bros. launched at North Shields, for Messrs. Kelsall Bros. & Beeching, the steel steam trawler *Plover*, a vessel of 144 tons gross.

Lark.—On May 31st Messrs. Cook, Welton & Gemmell launched at Hull, for the Pickering and Haldane Steam Fishing Co., Hull, the iron steam trawler *Lark*, a vessel of 185 tons gross.

Ariadne.—On Monday, May 31st, Messrs. Wigham Richardson & Co. launched a steel-screw steamer from their Neptune shipyard, Newcastle-on-Tyne, which they are building to the order of the Finska Angfartygs Aktiebolaget, of Helsingfors. The steamer is 292 ft. in length by 38½ ft. in breadth, and will be rigged as a two-masted fore and aft schooner. She will have comfortable accommodation for about a dozen passengers. The propelling machinery and boilers are also being constructed by Messrs. Wigham Richardson & Co., making the fifth set of machinery supplied to this company. The auxiliary machinery for working both the ship and her cargo is of the most modern and complete character, including steam winches, steam windlass, steam steering-gear, &c. As the vessel left the ways she was named the *Ariadne*, the christening ceremony being gracefully performed by Mrs. W. Minnet Good, of Hull. Amongst the company present at the launch were Mr. Lars Krogius, of Helsingfors, manager of the owning company; Mr. H. Lindfors, their superintendent engineer; Mr. Good, of Hull; the English agent for the company; Miss Ferguson; Mr. Drakenberg, of Stockholm; Miss Wright and Miss Schubert, of Stockholm.

Prince Edward.—On May 31st Messrs. Earles' Shipbuilding Co., of Hull, launched the above vessel from their yard. The vessel, which is being built to the order of the Dominion Atlantic Railway Co. for fast passenger and cargo service on the coast of Canada, is a handsome boat, 268 ft. by 33 ft. by 13 ft., and is intended to attain a speed at sea of 18 knots. Her engines are of triple-expansion type, driving twin screws,

and are of the following dimensions:—19 in., 30 in, 48 in., by 24-in. stroke, taking steam from two large double-ended boilers with forced draught. She has been constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, and is handsomely fitted throughout, with accommodation for 316 first and 30 steerage passengers; lighted by electric light, and has artificial ventilation; she is also provided with special gear for quick handling of cargo, and all the latest appliances for the comfort of passengers. The vessel was christened by Mrs. Ronald, the wife of one of the directors of the company, and will proceed to the builders' wharf to receive her machinery and other gear immediately.

Armorel.—On June 1st a wooden sailing ketch of about 37 tons, named the *Armorel*, owned by Mr. T. Holt, was launched at Dartmouth.

Martin.—On June 1st Messrs. Edwards Bros. launched at North Shields, for Messrs. Kelsall Bros. & Beeching, the steel screw steamer *Martin*, a vessel of 240 tons gross, built for the fish-carrying business.

Llandudno.—On June 1st Messrs. Ropner & Son launched at Stockton-on-Tees, to the order of Messrs. Evan Thomas, Radcliffe & Co., Cardiff, a steel screw steamer of the following dimensions, viz :—Length, b.p., 336 ft. 6 in.; breadth, extreme, 46 ft. 6 in.; and depth, moulded, 27 ft. 3 in.; built off the three-decked rule, and fitted with the builders' patent trunk, full poop, bridge, and topgallant forecastle. The saloon and cabins for captain and officers will be fitted up in the poop, and the accommodation for engineers will be provided in iron houses on the bridge deck, the crew being berthed in the forecastle as usual. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of about 5,925 tons on Lloyd's summer freeboard. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co., Limited. She was named *Llandudno* by Miss Evelyn Ropner, of Preston Hall.

Harmonic.—On June 1st Messrs. S. P. Austin & Son, Limited, launched from the Wear Dockyard, Sunderland, a steel screw steamer to the order of Messrs. J. and C. Harrison, of London, Newcastle, Cardiff, &c. The estimated deadweight capacity is 4,400 tons, to be carried on a light draught of water, and she will be classed 100 A1 at Lloyd's, under special survey, on the three-deck rule, with one deck laid. Water ballast is fitted in cellular double bottom all fore and aft, and in the after peak. The deck fittings will include powerful steam winches, direct steam capstan windlass, steam steering gear by Donkin & Co., fitted in wheel-house amidships, and screw steering gear by John Hastie & Co., fitted aft. The machinery will be supplied by Messrs. George Clark, Limited, of Southwick Engine Works, Sunderland. The launch was successfully carried out, and the ceremony of naming the vessel the *Harmonic* was performed by Mrs. F. A. Harrison, wife of one of the owners.

Tai-Chu.—On June 1st there was launched from the yard of Sir James Laing, Deptford, a steamer, built to the order of the Osaka Shosen Kaisha, of Japan. The vessel is 330 ft. long by 43 ft. 10 in. by 27 ft. 7 in. moulded, is designed as a passenger and cargo steamer, and has accommodation for some 30 first-class passengers, who are berthed in the fore-end of the bridge, and 50 second-class passengers, who are berthed in the after-end of the bridge and in the poop, and has a carrying capacity of some 3,000 tons. The saloon is situated in a large deckhouse on the bridge deck, and will be panelled in oak, while in the same deckhouse is the saloon entrance and social hall, all of which are to be fitted with hardwood and carvings. The vessel is to be fitted with triple-expansion engines by Messrs. John Dickinson & Sons, Limited, Palmer's Hill Engine Works, the steam being supplied from four single-ended boilers. The vessel on being launched was named the *Tai-chu* by Mrs. Watanabe, of London.

Clan Monroe.—On June 3rd there was launched from Pallion yard the s.s. *Clan Monroe*, the third of the four 400 ft. turret steamers building by Messrs. William Doxford & Sons, Limited, for the Clan Line Steamers, Limited, Glasgow. She has large measurement capacity, and carries 7,000 tons deadweight, steaming 12 knots. Like her sister vessels, she has been built to the British Corporation class under special survey, and has been superintended for the owners by Mr. John Lyall and Captain J. E. Roberts, together with their assistants, Messrs. Jackson, Black, and Watts. The vessel, on moving down the ways, was named by Miss Percival, of Liverpool.

Orissa.—On June 3rd there was launched from the shipbuilding yard of Sir James Laing, at Deptford, Sunderland, a steamer built for the British India Steamship Navigation Co. She was built on a new berth, and is the largest cargo-carrying boat ever launched from the Deptford yard. Upon leaving the ways she was christened *Orissa* by Miss Hilda Laing, daughter of Mr. Arthur Laing, J.P. The vessel has been built to carry about 8,400 tons of cargo. She will be engined by Messrs. Geo. Clark, Limited, Southwick.

Linnet.—On June 3rd Messrs. Cook, Welton & Gemmell launched at Hull, for the Pickering and Haldane Steam Fishing Co., Hull, the steam trawler *Linnet*, a vessel of 185 tons gross.

Twin-screw Tender.—On June 3rd Messrs. R. Craggs & Sons launched at Middlesbrough, to the order of the Honourable Corporation of Trinity House, London, a steel twin-screw tender of the following dimensions :—Length, 135 ft.; breadth, 22 ft.; depth, 13 ft. The vessel has teak decks fore and aft, and has been specially constructed for lightship service. She will be fitted with powerful engines by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, having cylinders 10 in., 15 in., and 25 in., by 18 in. stroke.

Uller.—On June 4th a handsome steel screw steamer was launched from the yard of Messrs. John Priestman & Co., Southwick, built to the order of Mr. Hjalmar Röed, of Tonsberg, Norway. Her dimensions are:—Length, 281 ft.; breadth, 39 ft. 6 in.; depth, moulded, 17 ft. 8 in.; and she has been built under special survey to the highest class of Det Norske Veritas, on the partial awning deck principle. The vessel is divided into watertight compartments by four steel bulkheads, and a double bottom in each hold, together with the after peak, provides ample water ballast. She is fitted with four large hatchways, four powerful steam winches, patent direct-acting steam windlass, steam steering gear, and all necessary gear for the rapid working of cargo. A large deckhouse is fitted on the awning deck, containing a tastefully-fitted saloon and accommodation for captain and 10 passengers. The engineers and officers are berthed at the after end of the engine casing, under the awning deck, and the crew forward. The engines have been constructed by the North-Eastern Marine Engineering Co., Limited, Wallsend-on-Tyne, the cylinders being 20½ in., 34 in., and 56 in. diameter, with a stroke of 39 in., steam being supplied by two boilers working at a pressure of 160 lbs. per square inch. A very successful launch was witnessed by a large company of ladies and gentlemen, the christening ceremony being performed by Mrs. McNair, of Glasgow, who named the vessel *Uller*. The construction of the steamer has been superintended by Mr. A. McFarlane and Captain Svendsen on behalf of the owners.

Caledonia.—On June 5th the new steam trawler *Caledonia*, constructed for the Grimsby Alliance Steam Fishing Co., was launched from the yard of Earle's Shipbuilding and Engineering Co., Limited, Hull. The vessel is 108 ft. 9 in. long, 20 ft. 6 in. beam, by 11 ft. 8 in. moulded depth, and she will be fitted by the builders with triple-expansion engines, and also with an electric light installation.

Tai-Nan.—On Thursday, June 10th, Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuildng Yard, Sunderland, launched the *Tai-Nan*, a finely modelled, high class passenger and cargo vessel, which has been built to the order of Messrs. The Osaka Shosen Kabushiki Kaisha, of Osaka, Japan, and is the third vessel built by this firm for these owners. Her principal dimensions are :—Length, between perpendiculars, 330 ft.; breadth, 43 ft.; depth moulded to spar-deck, 28 ft. 3 in. She is designed on very fine lines, and will have a deadweight cargo capacity of about 3,000 tons. She will attain a speed of about 14½ knots in service. The vessel is built to Lloyd's highest class, on the spar-deck rules, and is intended for the owners service between Japan and the China Sea. She is built on the cellular bottom system, being arranged for water ballast right fore and aft, and in both the fore and after peaks. The passenger and other accommodation is of a very high class description, first-class accommodation being allowed for 30 passengers, the berths being placed in the forward end of the bridge. A large commodious saloon, entrance hall, social hall, and pantry, are placed in a house on top of the bridge. Over this house is fitted accommodation for captain and charthouse, on top of which is fitted a flying bridge. The bath and sanitary accommodation is fitted in the bridge, aft of the passenger accommodation, and is separately arranged for

both Europeans and Japanese. A mail room is also fitted in this part of the ship. Aft of the passenger accommodation is fitted the berths for the officers and engineers, with mess room, etc., etc. Aft of this again is fitted part of the sleeping accommodation for 50 second-class passengers at the sides of the ship, the centre amidships, aft of the engine and boiling casings, being occupied by the second-class dining saloon, a large spacious apartment. Connected with this accommodation is also fitted the usual bath and sanitary arrangements, pantry, etc. The first-class smoke room is fitted on top of the bridge at the after end of the casings. The steam steering gear is also fitted at this part of the ship, and is controlled by gearing worked from the forward bridge. The remainder of the second-class accommodation, with the accommodation for part of the engineers, officers, doctor, surgery, etc., is arranged in the poop. The seamen and petty officers are berthed in the top-gallant forecastle, and aft of this accommodation is fitted ample sanitary arrangements for the crew and emigrants, store-rooms, etc. In the 'tween decks forward, accommodation is arranged for the firemen, with emigrants pantry, store-rooms, etc. The whole of the forward 'tween decks is arranged for the accommodation of emigrants. Large European and Japanese galleys are placed in the centre of the vessel. In the after 'tween decks are placed large cold storage chambers, connected with a powerful refrigerating machine. Eight boats are fitted on the bridge amidships, two of them being steel lifeboats. The cargo will be worked through three main hatchways, having five steel winches in all, the masts being fitted with double steel derricks at each hatch. The vessel will be rigged as a two-masted fore-and-aft schooner. A patent steam windlass is fitted on the forecastle head, and a powerful screw gear on the poop aft. In connection with the facilities for handling of cargoes, a number of cargo ports are fitted in the ship's side. The whole of the vessel's 'tween decks is pierced with lights. Special attention has been given to the whole of the details in connection with the arrangement and in the fitting up of the vessel, and she will in all respects be a most complete and high class passenger and cargo vessel. A complete electric light installation and electric bell arrangement will be fitted by the Sunderland Forge and Engineering Co., Limited. The whole of the accommodation is also fitted with a steam heating arrangement. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited, of Sunderland, the sizes of the cylinders being 28½ in., 47½ in., 79 in. by 48-in. stroke, the steam being supplied by four powerful single-ended boilers working at 180 lbs. pressure. The vessel has been constructed under the personal supervision of Mr. S. Konishi, the chief superintendent of the owners' company, the engines being also overlooked by Mr. Atsumi, the engineering superintendent of the company, and these gentlemen have been assisted by a number of Japanese inspectors. The launch was a most successful one, the christening ceremony being gracefully performed by Mrs. Watanabe, of London, and the vessel being launched by hydraulic power. There were also present at the launch Mr. Watanabe, Mr. S. Konishi, Mr. Atsumi, Mr. N. Fukuda, Commander in the Imperial Japanese Navy; Mr. S. Kosaka and Mr. K. Mera, Lieutenants in the Imperial Japanese Navy; Captain G. Tarao, Captain S. Negata, Mr. G. Katsura, Mr. S. Tomonaga, Mr. K. Hashizume, and Captain Hubback, all of the owners' company; also Mr. Vico Vecchi (Trieste), Mrs. Robert Thompson, Mrs. C. E. Thompson, Miss May Thompson, Miss Darling, Mr. and Mrs. W. Pinkney, the representatives of the builders' firm, etc. After the launch, the company adjourned to the firm's luncheon-room, where the usual toasts were duly honoured.

Deusto.—On Saturday, June 12th, Sir Raylton Dixon & Co., launched from Cleveland Dockyards, Middlesbrough, a fine steel screw steamer, built to the order of Senor Ramon de la Sota, of Bilbao, under the personal supervision of Captain Luis de Ybarra. She is built to Lloyd's highest class, raised quarter-deck rule, her principal dimensions being—length 259 ft.; beam, 37 ft.; depth, moulded, 19 ft. 6 in.; and has a deadweight capacity of about 2,500 tons, on a very light draught of water. She is fitted with water ballast in cellular double-bottom and in after peak, all decks of steel and iron, four bulkheads, plate and bilge keels. Triple-expansion engines will be fitted by Messrs. Sir Christopher Furness, Westgarth, & Co., Limited, having cylinders 18 in., 29½ in., 48½ in., by 33 in. stroke, with two large single-ended boilers working at 160 lbs. pressure. On leaving the ways she was gracefully named *Deusto* by Mrs. J. Greenhow, of Hartlepool.

Lady Lewis.—On Thursday afternoon, June 17th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 342 ft.; breadth, extreme, 43 ft.; depth, moulded, 25 ft. 9 in.; gross tonnage, about 2,940 tons. This vessel, which has been built to the order of W. J. Tatern, Esq., of Cardiff, will class 100 A1 on Lloyd's Register, and has been built under special survey. She is built to the three-deck rule, with one deck laid, has a poop aft for captain and passengers; long bridge, with accommodation for officers and engineers in after end, and a topgallant forecastle for crew. A cellular double bottom throughout, and after peak tank are fitted for water ballast, and her equipment includes five steam winches, large horizontal donkey boiler, steam windlass, stockless anchors, steam steering gear, &c., &c. Triple-expansion engines will be supplied by Messrs. Blair & Co., with boilers having a working pressure of 160 lbs. The vessel was christened *Lady Lewis* by Mrs. Evans, wife of Captain Evans, of Cardiff. Mr. F. D. Price, of Newcastle-on-Tyne, has superintended the vessel during construction, and Captain Evans is overlooking the fitting-out.

Russie.—On Thursday, June 17th, there was launched from the yard of the Sunderland Shipbuilding Co., Limited, a steel screw steamer, built to the order of Messrs. La Société Générale de Transports Maritimes à Vapeur Marseilles. The vessel is built to the unsinkable class at Veritas, spar deck rule, with poop, bridge, topgallant forecastle, and shade deck, and has exceedingly fine lines so as to attain a high rate of speed, as she is intended to run in the mail service under contract with the French Government, between Marseilles and Oran. This steamer has accommodation for 34 first-class, 40 second, and 40 third-class passengers. The first-class dining saloon is on the spar deck, and above that is placed the smoking and captain's rooms. The whole of the decks of this ship are of teak, and she will be fitted up in every way to make her suitable for trading in hot climates. The accommodation throughout the ship for first and second-class passengers, officers and engineers, is fitted up in polished hardwoods. The main engines are by the North Eastern Marine Engineering Co., Limited, Wallsend, and have all the latest improvements, including separate feed pumps, feed heater evaporator, &c. She has also complete installation of electric lighting by Messrs. Siemens Bros., of Newcastle. Both the hull and machinery of this steamer have been inspected by Messrs. Ashlin & Daglish, of Liverpool and London. The vessel was gracefully named *Russie* by Miss Annie Cohan, of Liverpool.

Pallas.—On June 17th was launched the steel screw steamer *Pallas*, built by Messrs. William Gray & Co., Limited, for Messrs. Schmidt & Hansen, of Flensburg, through Messrs E. A. Casper & Co., of West Hartlepool. The steamer is intended for the timber and general cargo trade and takes Lloyd's highest class, and her dimensions are:—Length, over all, 270 ft.; breadth, 39 ft.; depth, 18 ft. 2 in. She has a half-poop, raised quarterdeck, and partial awning-deck, with houses on deck for cabins. The hull is built with deep framing and cellular double-bottom, and the equipment will be of the most improved description, including steam windlass, steam steering gear, four steam winches, &c. She will have triple-expansion engines made at the Central Marine Engine Works of Messrs. William Gray & Co., Limited, having cylinders 19 in., 30½ in. and 51 in., with a piston stroke of 36 in., and two steel boilers to work at a pressure of 160 lbs. per square inch. The ceremony of naming the ship was gracefully performed by Mrs. Harold Casper, of West Hartlepool.

Olivemoor.—On June 17th Messrs. William Gray & Co., Limited, launched a fine large steel screw steamer which they have built to the order of Messrs. Runciman & Co., of Newcastle-on-Tyne. She will take Lloyd's highest class, and is of the following dimensions:—Length, over all, 336 ft.; breadth, 47 ft. 10 in.; and depth, 24 ft. The deck erections consist of a full poop, long bridge and topgallant forecastle. The saloon and captain's and officers' rooms will be fitted under the poop. The hull is built with web frames and cellular double bottom for water ballast. Five steam winches, steam steering gear amid ships and screw gear aft, patent direct steam windlass, patent donkey boiler, grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Three cylinder triple-expansion engines of first-class make are being supplied by the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited. They will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston

stroke of 42 in., and fine extra large steel boilers having a pressure of 160 lbs. per square inch, will give an ample supply of steam. The construction of the ship has been under the superintendence of Captain Runciman on behalf of the owners, and the ceremony of christening the steamer *Olivemoor* was gracefully performed by Miss Bains, of West Hartlepool.

Montrose.—On Thursday, June 17th, Middlesbrough once more marked an epoch in the history of its onward career by the launch of the largest steamer that has been built on the banks of the Tees. This interesting event took place from the Cleveland Dockyards of Sir Raylton Dixon & Co., when the large Canadian cattle steamer, which has been built to the order of Messrs. Elder, Dempster & Co., of Liverpool, was safely launched amidst the cheers of a numerous concourse of spectators. She is built to Lloyd's highest class three-deck rule, her principal dimensions being:—Length, 460 ft.; beam, 52 ft.; depth, moulded, 30 ft. 7 in., with a deadweight capacity of over 8,000 tons. She has been constructed for the Canadian cattle trade, and specially fitted with cold chambers on the Linde system for the conveyance of dairy produce by special arrangement with the Canadian Government. The vessel is fitted with shelter deck of iron, upper and main decks of steel, shade deck yellow pine, seven bulkheads, and a complete electric light installation by Messrs. W. H. Allen, Son & Co., Bedford. Handsome accommodation will be fitted on bridge and shelter-decks for captain, officers, and engineers, with seamen and petty officers in the forecastle, and firemen and cattlemen under upper deck forward, with foremen cattlemen aft. Very powerful triple-expansion engines will be fitted by Messrs. T. Richardson & Sons, Limited, of Hartlepool, having cylinders 30 in., 50 in., 82 in. by 54 in. stroke, supplied with steam by three large double-ended boilers working at 180 lbs. pressure. The engines are also fitted with manganese bronze bladed propeller, &c., &c. It is expected when this vessel is completed she will be one of the speediest boats in the Canadian trade. On leaving the ways she was named *Montrose* by Mrs. Evans, wife of Captain Evans, who has superintended the building of the ship for her owners.

Port Phillip.—On Thursday, June 17th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer built to the order of Messrs. Wm. Milburn & Co., of Newcastle and London, and of the following dimensions, viz.:—Length, 325 ft.; breadth, 48 ft. 6 in.; depth, 24 ft., and to class 100 A1 at Lloyd's on the single-decked rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including nine double-cylindered steam winches, direct-acting steam windlass, large donkey boiler working at high pressure, steam steering gear by Messrs. Donkin & Co., and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. The North-Eastern Marine Engineering Co., Limited, are of the triple-expansion type, having cylinders 23 in., 38 in., and 64 in., by 45-in stroke, and working at a pressure of 180 lbs. On leaving the ways the vessel was named the *Port Phillip* by Miss Grace Brunton, of Tynemouth.

Alnmere.—On June 17th there was aunched from the shipbuilding yard of Messrs. John Readhead & Sons, South Shields, a new screw steamer, which has been built to the order of Messrs. Fred. A. Jaques & Co., of Newcastle. Her dimensions are:—Length, 322 ft.; breadth, 46½ ft.; depth, moulded, 26 ft. 11½ in. She is of the improved single deck type and classed 100 A1 at Lloyd's under special survey; having poop aft, bridge amidships, with accommodation for engineers, and topgallant forecastle for crew. The captain and officers are berthed in a large deck-house on the bridge deck. The vessel has cellular double bottom fore and aft for water ballast, and is equipped with all the modern improvements for the rapid loading and discharging of cargo, including large donkey boiler. She has a deadweight carrying capacity of 5,500 tons on a light draught. The engines, also built by Messrs. Readhead & Sons, are of the triple-expansion type, having cylinders 24 in., 40 in., and 64., by 42-in. stroke, steam being supplied by two large steel boilers. The vessel and machinery have been built under the inspection of Mr. George Jaques. As she left the ways the steamer was named the *Alnmere* by Miss Ursula Jaques, eldest daughter of Mr. Fred. A. Jaques.

Aileen.—On June 17th the paddle steamer *Aileen* was launched from Sir W. G. Armstrong, Whitworth & Co.'s shipyard at Walker-on-Tyne. The *Aileen* is a sister vessel to the *Audrey*, which made her debut in the passenger and excursion services on the Tyne at Whitsuntide.

Connaught.—On June 17th the last of the new fast mail steamers, built to the order of the City of Dublin Steam-Packet Co. for the Holyhead and Kingstown mail service by Messrs. Laird Brothers, was successfully launched at Birkenhead. The vessel was built on the lines of her three sister vessels already placed on the same route, her carrying capacity and passenger accommodation being in every respect in accord with the specifications of the other vessels. She received the name of *Connaught* from Miss Violet Watson, daughter of Mr. William Watson, J.P., chairman of the company.

Ursula Bright.—Lately a large steel screw steamer has been launched from the yard of Messrs. John Priestman & Co., at Southwick, Sunderland, to the order of Mr. W. Leatham Bright, of London. The dimensions of the vessel are:—Length, 336 ft.; breadth, 47 ft.; depth moulded, 26 ft. 10 in. She is constructed to the three-deck rule of Lloyd's Registry, in which she will receive the highest class, is fitted with poop, long bridge, and topgallant forecastle, and is divided into watertight compartments by five steel bulkheads. Ample water ballast is provided for in the double bottom forward and aft, together with the after peak. There are four large hatchways on the upper deck, five powerful steam winches, and all the latest appliances for the quick working of cargoes. The steam steering-gear is fitted in a house at the after-end of the bridge, being controlled from the pilot-bridge by shafting. On the bridge deck are large deck-houses for the accommodation of captain, officers, and engineers, the crew having spacious accommodation in the topgallant forecastle. The engines and boilers have been built by Messrs. Blair & Co., of Stockton-on-Tees, being on the triple-expansion principle, with cylinders 24 in., 40 in., and 66 in., with 45-in. stroke. The two boilers are of the single-ended type, with a working pressure of 160 lbs. per square inch. The vessel, which has been constructed under the supervision of Mr. Sage, of London, was christened *Ursula Bright* by Miss Muriel Wrightson, of Sunderland.

LAUNCHES—Scotch.

Elf and Escort.—On May 20th Messrs. Mackie & Thomson, of Govan, launched the steam screw trawlers *Elf* and *Escort* each vessel being about 165 tons gross. They will class 100 A. and are owned by the Great Northern Steam Fishing Co., Hull.

Merlin.—On May 20th Messrs. Mackie & Thomson launched at Govan the steel steam yacht *Merlin* for Mr. R. G. Allan. She is a vessel of 194 tons y.m., and is to take the highest class in Lloyd's Yacht Register.

Brighton Queen.—On May 20th the Clydebank Engineering and Shipbuilding Co., launched for the Brighton, Worthing and South Coast Steamship Co., Limited, the paddle steamer *Brighton Queen*. Her dimensions are:—Length, 250 ft.; breadth, 28 ft.; depth, 17 ft., and is over 600 tons gross. She has been constructed to fulfil the requirements of the Board of Trade, and has special subdivision by steel bulkheads; these have been arranged so that the ship is formed into 10 watertight compartments, and with any two adjacent compartments flooded, the ship would still remain afloat. The engines are of the compound diagonal surface-condensing type, having separate condenser, and the boiler is of the double-ended return-tube type. The promenade deck extends from the stem to within 15 ft. of the stern, and is the full width of the ship.

Campeche.—On Monday afternoon, May 24th, Messrs. Archd. M'Millan & Son, Limited, Dumbarton, launched the steel screw-steamer *Campeche*, of dimensions 145 ft. by 23 ft. by 9 ft. 9 in., which they have built to the order of Senor Don Domingo Abaunza, of Tabasco, for trade in the Gulf of Mexico. Triple-expansion machinery is being supplied by Messrs. David Rowan & Son.

Pluto.—On Thursday evening, May 27th, Messrs. A. & J. Inglis launched at Pointhouse, on the Clyde, a steel screw steamer named the *Pluto*, for the Bristol Steam Navigation Co. Her dimensions are 240 ft. by 31 ft. by 18 ft. 9 in., and her engines of 1,000 I.H.P.

Fairy Queen.—On May 28th there was launched from the shipbuilding yard of Messrs. Bow, M'Lachlan & Co., Paisley, a trim little vessel built to meet the requirements of pleasure

sailing on the Forth and Clyde Canal, to the order of James Aitken & Co., Limited, owners of the *Fairy Queen*, recently disposed of to the Shannon Development Co., Dublin. Every improvement suggested by the experience of former years has been introduced into the new boat. Accommodation is provided for over 200 passengers. The engines are of the upright compound surface-condensing type, of 85 H.P., and the marine boiler is wrought at a pressure of 120 lbs. As she left the ways the vessel was christened *Fairy Queen* by Miss Lottie Alexander, Rosemount, Kirkintilloch.

Fairy.—On May 29th the Fairfield Co. launched H.M.S. *Fairy*, the third of three 30-knot torpedo-boat destroyers at present under construction in the yard for the British Government.

Kethailes.—On May 29th Messrs. Ramage & Ferguson, Limited, Leith, launched from their yard the large full-powered steam yacht *Kethailes* (460 tons Y.M.) built to the order of William Johnston, Esq., shipowner, Liverpool, from the designs of Mr. St. Clare J. Byrne, Liverpool. She will be fitted with engines, boiler, &c., by the builders.

Sir John.—On June 1st, Messrs. Gourlay, Brothers & Co. launched from their yard at Dundee the twin screw steam tug *Sir John*, building to the order of the Colonial Government. The vessel, which has been built under the superintendence of Mr. J. Wolfe Barry, C.B. and R.S., the consulting engineer to the Natal Government, assisted by Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, as resident engineers, is of the following dimensions:—150 ft. by 28 ft. by 14 ft., and is intended to attain 13 knots per hour. She has been constructed to Lloyd's highest class and has been built under Lloyd's special survey both as regards hull and machinery. Steam will be supplied by two large boilers at a working pressure of 160 lbs., and the triple-expansion engines of dimensions, 16 in., 26½ in. and 42 in. by 27 in. stroke, are capable of developing the high speed required for the vessel's service. There is a complete installation of pumping and towing gear, and the vessel will be lighted by electric light, including a powerful search light. The vessel was christened by Miss Hunter, daughter of the general manager of Natal Government Railway. The ceremony was attended by Mr. Walter Peace, C.M.G., Agent-General for Natal; Mr. David Hunter, of Natal, Mr. Brereton, Mr. A. B. Johnson, and a large company.

Inaba Maru.—On Tuesday afternoon, June 1st, there was launched from the shipbuilding yard of Messrs. David & Wm. Henderson & Co., Partick, a handsomely modelled twin-screw steamer which has been built to the order of the Nippon Yusen Kaisha, of Tokio. This vessel, as in the case of the three similar steamers which have recently been completed by the same builders, has been built under the supervision of A. R. Brown, Esq., Japanese Consul at Glasgow, who has been assisted by Captain Periam for the hull, and Mr. George McFarlane for the engine department. Her principal dimensions are—Length over all, 463 ft.; beam, moulded, 49 ft. 2 in.; depth, moulded, 33 ft. 6 in., and a gross tonnage of about 6,000 tons. Classed in Lloyd's 100 A1 three deck rule. A most complete installation of electric light by W. C. Martin & Co., Glasgow, is being fitted throughout the vessel. Napier Brothers capstan windlass and Caldwell's steam steering gear. The machinery will be supplied by the builders' firm and consists of two sets of triple-expansion engines, each having cylinders 20 in., 33½ in., and 56 in. diameter by 48 in. stroke, steam being supplied by two large double-ended and two single-ended boilers constructed for a working pressure of 200 lbs. per square inch. On leaving the ways the vessel was gracefully named the *Inaba Maru* by Miss Brown.

Curlew.—On June 1st the Dundee Shipbuilders' Co., Limited, launched from their Panmure yard a steam line fishing boat, built for the new Tay Steam Line Fishing Co., Limited. The dimensions are—103 ft. in length, over all, 19 ft. 6 in. broad, and 10 ft. 6 in. moulded depth. She will be fitted by Messrs. James Carmichael & Co., Limited, with compound surface-condensing engines of 45 N.H.P. Both boat and engines are classed 100 A1 at Lloyd's. The boat will be specially adapted for the steam line fishing trade. As the vessel left the ways she was named *Curlew* by Miss Gibson.

Cape Breton.—On June 1st Messrs. A. Rodger & Co., Port-Glasgow, launched a steel screw steamer to the order of Messrs. Dawson Brothers, Glasgow. The dimensions are:—Length, 162 ft.; breadth, 22 ft. 6 in.; depth, 12 ft. 6 in. This steamer will carry 630 tons deadweight, and will be employed in the coasting traffic. The machinery will be supplied by Messrs. M'Kie & Baxter, Glasgow. The vessel was named *Cape Breton*.

Bona.—On Wednesday afternoon, June 2nd, there was successfully launched from the yard of Messrs. David and William Henderson & Co., Partick, a high-class composite sailing yacht, which they have built to the order of the Duke de Abruzzi, from the designs of Mr. G. L. Watson. The vessel was gracefully named the *Bona* by Mrs. Breen, wife of the Italian Consul General for Scotland. As the fittings of the yacht are well advanced it is anticipated she will leave for Gourock Bay early the following week and be able to have a trial spin shortly thereafter. Internally the yacht is very neatly finished, the main saloon being of exceptional size, and as she is intended for cruising as well as racing purposes, every attention has been given to ensure the comfort of guests on board. The *Bona* will be in the capable hands of Captain Sycamore, who will have under him a picked crew of south of England men.

Jaffa.—On June 2nd there was launched from the yard of Messrs. John Scott & Co. the steel screw steamer *Jaffa*, built for a special trade for Messrs. Bailey & Leetham, Limited, of Hull. The vessel is of the long full poop type, with topgallant forecastle, and is of the following dimensions:—260 ft. by 35 ft. by 19 ft., with triple engines; cylinders, 22 in., 36 in., and 60 in. by 39 in. stroke; and two extra large boilers for a working pressure of 180 lbs. per square inch. She has accommodation for a large number of first-class passengers in a large deckhouse amidships, and has the usual Board of Trade passenger certificate. The vessel was christened by Miss Crawford, and had steam up, and immediately proceeded on her trial trip.

Urbs Intacta.—On June 2nd Messrs. Fleming & Ferguson, Limited, launched from their yard at Paisley a powerful twin-screw hopper dredger, built to the order of the Waterford Harbour Commissioners. The dredger is capable of raising 500 tons of material per hour from a depth of 35 ft., and has a hopper carrying capacity of 13,000 cubic feet. The vessel is fitted with the builders' patent independent traversing gear for projecting the bucket ladder in advance of hull, to enable it to cut its own flotation through banks and shoals. The vessel will be fitted by the builders with two sets of triple-expansion engines capable of driving her at a speed of nine knots. During construction the vessel has been under the supervision of Mr. Wilson Wingate, of London, with Mr. Anderson, of Renfrew, as local inspector. As she left the ways the vessel was named *Urbs Intacta* by Mrs. Cherry, Lacelta, Gourock.

Kastalia.—On June 2nd the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, launched from their yard at Govan a large steel screw steamer for Messrs. Donaldson Brothers' Canadian cattle and cargo trade. The dimensions of the vessel are:—Length, 377 ft.; breadth, 46 ft. 7 in.; depth, 29 ft. 6 in. She is designed to carry 6,200 tons deadweight, with a gross tonnage of about 4,300 tons, and is fitted with all the most modern appliances for handling cargo, including nine large steam winches by Clarke, Chapman & Co.; steam steering gear by the Harrison Co., of Manchester, and Napier Brothers' steam capstan windlass. The spar deck throughout is fitted for cattle, and the main deck is arranged so that it can be similarly used. The steam winches are placed on platforms raised sufficiently high above spar deck to keep them clear of the cattle. The after 'tween decks are divided into four refrigerating chambers for the carriage of Canadian dairy produce, frozen meat, &c, the refrigerating machinery being by Messrs. J. and E. Hall, and the insulation by the builders. Besides having a double bottom on the cellular system all fore and aft, there is a large chamber tank abaft the engine-room capable of holding about 650 tons, and the fore and after peaks are also fitted for water ballast. The captain, officers and engineers are berthed on the bridge deck, where there is also placed the saloon and passenger accommodation. The crew are berthed under the forecastle, and there is accommodation for a large number of cattlemen in the lower forecastle. Steam fans are being fitted for circulating air in the 'tween decks, and everything has been constructed to pass the American and British regulations for carrying cattle, grain, &c. The vessel is being fitted by the builders with triple-expansion engines of the most modern type. The cylinders are 27 in., 44 in., and 72 in. in diameter respectively, with a stroke of 48 in. The main boilers are two in number, single-ended, 15 ft. 4 in. in diameter by 11 ft. 9 in. long, each boiler having three furnaces. They are fitted

with Howden's forced draught, and the direct driven fan and engine have also been supplied by Howden & Co. A winch boiler of large size is fitted in the stoke-hold, and for discharging ashes a Galloway's ash hoist and automatic tip are fitted to one of the ventilators. There are four auxiliary steam pumps; one for ballast purposes, which can also be used as a bilge pump or as an auxiliary circulating pump. There is also a duplex pump for general purposes, and a smaller duplex pump for the fresh water supply. For keeping up the supply of fresh water for the boilers a very large evaporator, made by G. & J. Weir, is fitted in the engine-room with the requisite connections, and in conjunction with the system of feed pipes discharging into the main boilers an Edmiston's feed-water filter and a Hocking's feed-water heater are fitted. All the arrangements, connections, and fittings are most complete, and everything has been done to make the handling of the engine department as economical and efficient as possible. As the vessel left the ways she was named the *Kastalia* by Mrs. J. D. Bonnar, of Beechwood, Helensburgh.

Hougomont.—On June 3rd Messrs. Scott & Co., engineers and shipbuilders, Greenock, launched the large and finely-modelled steel sailing ship *Hougomont*, of about 2,200 tons net register, and about 4,000 tons deadweight, which has been built to the order of Mr. Archibald Russell, of Auchinraith, Bothwell. The dimensions of the vessel are:—Length, 293 ft.; breadth, 45 ft.; and depth, moulded, 26 ft. She will be rigged as a four-masted barque, with double topsail, double topgallant sails and royals; and on completion she will receive the highest class of the British Corporation registry, under whose rules and special survey she has been constructed. The *Hougomont*, in addition to having a complete steel upper deck sheathed with yellow pine and laid 'tween decks fore and aft, has been built on the deep frame principle, which provides a large amount of additional transverse strength to the hull. All the latest and most approved appliances are fitted up for working the cargo and handling the sails, and superior accommodation is provided for both officers and crew, also two spare state-rooms for passengers. She has been constructed under the supervision of Captain James Fullarton.

Mallard.—On June 3rd Messrs. John Reid & Co., Limited, launched from their yard at Whiteinch, a handsome steel screw steam yacht, named *Mallard*, of 115 tons yacht measurement, designed by Mr. James Reid, and built for Mr. Thomas Barclay, of Edinburgh. The machinery, which consists of triple-expansion engines, has been supplied and fitted by Messrs. Ross & Duncan, Govan. Immediately after the launch the yacht proceeded down the river on a preliminary trial trip. This is the third steam yacht built by Messrs. Reid for Mr. Barclay.

Weasel.—On June 3rd another addition was made to the Aberdeen fishing fleet, a trawler having been launched by Messrs. J. Duthie, Sons & Co., Footdee. The vessel was built to the order of Mr. Manchester, of North Wales, and was constructed to class above Lloyd's requirements. She is 115 ft. in length, 20 ft. in breadth, and 12 ft. in depth. She will carry on fishing operations in the Bay of Biscay and on the south coasts of England and Ireland.

Ulverston.—On June 3rd Messrs. A. Rodger & Co., Port Glasgow, launched the steel screw cargo-carrying steamer *Ulverston* for Messrs. Sunley & Co., London. The dimensions are:—Length, 314 ft.; breadth, 44 ft.; depth, 20 ft. 7 in. The steamer is 2,550 tons gross register, with a deadweight carrying capacity of about 4,300 tons. The machinery will be supplied by Messrs. Hall-Brown, Buttery & Co., Glasgow.

Romance.—On June 3rd there was launched by Mr. John Hilditch, at Carrickfergus, a steam yacht built to the order of Mr. A. J. A. Lepper, J.P., The Rhambuoy, Carrickfergus. The yacht, which was named the *Romance*, is a little vessel of 22 tons Thames measurement, and was designed by Mr. Dixon Kemp. She is fitted with triple-expansion engines of 80 I.H.P. The engines were supplied by the Liquid Fuel Engineering Co., Cowes, Isle of Wight. Oil will be used instead of coal, and the vessel has a carrying capacity for 300 gallons of oil.

Tuscarora.—On June 17th Messrs. Scott & Co., shipbuilders, Greenock, launched a fine steam yacht of 570 tons Y.M. for Mr. William Clark, of Curling Hall, Largs. The vessel has been built to replace the *Mohican*, and is of the following dimensions:—Length, 180 ft.; breadth, 26 ft. 6 in.; depth, 15 ft. 6 in. The builders will also furnish the engines, which will be triple-expansion of 1,000 I.H.P., and the cylinders will be of 16 in., 26 in., and 41 in. by 27 in. stroke. The yacht was named *Tuscarora* and will be commanded by Captain Simpson.

Walrus.—On June 18th Messrs. Wm. Simons & Co., Limited, Renfrew, launched complete, with all machinery on board, the *Walrus*, a suction pump dredger of 1,300 tons hopper capacity, which has been built to the order of Walter Peace, Esq., C.M.G., Agent-General for the Government of Natal. The *Walrus* is almost a duplicate vessel to the *Octopus*, constructed two years ago by the same builders, and which has proved so successful in removing the Bar at Durban. The dimensions of the *Walrus* are as follows:—Length, 215 ft.; breadth, 36 ft. 6 in.; depth, 15 ft. 9 in. It is constructed to Lloyd's highest class. The hull is subdivided into nine watertight compartments. Two centrifugal sand pumps of 33 in. diameter, each driven by independent sets of triple-expansion engines having separate condenser, and air and circulating pumps, are fitted in the forward part of the vessel. The pumps are capable of raising 3,000 tons of sand per hour, and working to a depth of 40 ft. under water level. The large main suction pipe, 44 in. diameter, is fitted in a central well at fore end, and is controlled by means of powerful hydraulic gear fitted on upper deck. This pipe is connected to both pumps and is fitted with a novel arrangement of flexible joints placed at about the centre of the pipe which enables the vessel to plunge about on a 25 ft. radius without disturbing the nozzle on the ground. The propelling engines are two sets of triple-expansion type of 1,250 I.H.P. driving twin propellers with a speed of 9½ knots per hour. The hopper doors are also worked by hydraulic appliances. The fittings also include auxiliary donkey boiler, feed heater, evaporator, and electric light installation is fitted throughout the vessel. This is the seventh dredging vessel built by Wm. Simons & Co., Limited, for the Government of Natal. The vessel has been constructed under the direction of J. Wolfe Barry, Esq., C.B., Consulting Engineer for the Natal Government, assisted by Mr. Wm. Inglis, Resident Inspector. The christening ceremony was performed by Mrs. Wm. Brown, Meadowflat.

Fawn.—On June 18th there was launched by Messrs. John Fullerton & Co., Paisley, to the order of Messrs. J. Piprell & Sons, Guernsey, for the St. Malo and Binic Steamship Co., Limited, Guernsey, a steel screw steamer of 200 tons measurement, designed for the light cargo and passenger traffic between Guernsey, St. Malo, and Binic, and is intended to develop the same, which has previously been carried on by sailing vessels. Compound engines of 320 H.P. are to be supplied by Messrs. Ross & Duncan, Govan. The steamer was named the *Fawn* by Mrs. Bost, Adelphi House, Paisley.

Haytor.—On June 18th Messrs. Wm. Hamilton & Co. launched from their Glen Yard, Port-Glasgow, a steel sailing barque of 1,985 tons gross and 1,857 tons net register tonnage, to carry 3,450 tons deadweight, for Messrs. John Holman & Sons, London. The following are the principal dimensions:—Length, about 270 ft.; breadth 40 ft.; depth, moulded, 25 ft. 1½ in. The vessel has been built to the highest class at Lloyd's, and is fitted out in the most modern manner for the quick and easy working of the ship. The accommodation for the officers and crew is of the most complete description, the captain and officers being placed in the poop, while the crew are berthed in two large deckhouses amidships, a special feature being a deckhouse specially set apart for articled apprentices. Store and lamp rooms are placed under the topgallant forecastle. A chart-house, containing stairway to saloon, is fitted on poop deck. As the vessel left the ways she was gracefully named the *Haytor* by Miss Abbott, of Dundee. After the launch the vessel was taken to James Watt Dock, Greenock, for masting.

Bucuresti.—On June 21st Messrs. R. Napier & Sons, Limited, launched from their yard at Govan the second of three steamers, each of above 2,200 tons, which they have in hand for the Direction Générale of the Roumanian State Railways, Bucurest. These fine vessels have been specially designed to meet the requirements of the Government State Railways, and are intended to develop the trade of the port of Constantza. Extensive harbours are at present being made there, and the new vessels will no doubt carry outwards the coal required for the railways and steamers engaged in running with the Orient and Ostend express to Constantinople, and in transporting the large quantities of cereals grown in Roumania

to the markets of Europe. The general dimensions of each are:—Length, 300 ft.; breadth, 39 ft. 6 in.; depth, 24 ft. 6 in. The machinery, also by Messrs. Napier, consists of a set of triple-expansion engines with two steel boilers. As the steamer moved down the ways she was named *Bucuresti* by the wife of Major T. Coanda, sub-director of the Service Maritime Roumaine.

Indrapura.—On June 21st Messrs. Charles Connell & Co. launched from their Scotstoun shipbuilding yard, Whiteinch, a steel screw steamer for Mr. G. B. Royden, of Liverpool. The dimensions are:—Length between perpendiculars, 400 ft.; breadth, moulded, 49 ft.; depth, moulded, 31 ft. 3 in.; carrying about 7,600 tons. She has been built to Lloyd's highest class, with cellular double bottom whole length of vessel, also having both peaks fitted as tanks for water ballast. The upper and main decks, right fore and aft, are of steel, the upper deck being of chequered steel, while the poop, bridge, and forecastle decks are of pine. The vessel is completely equipped with all the most modern appliances for safety and efficient working. Accommodation is provided in house on bridge deck for saloon, captain, officers, and engineers, the crew, as usual, being berthed in topgallant forecastle. The engines are of the most improved triple-expansion type, with large single-ended boilers fitted with Howden's system of forced draught, and are being constructed by Messrs. David Rowan & Son, Glasgow. The hull has been built under the superintendence of Captain Gardiner, and the engines of Mr. Gilbert S. Goodwin, consulting engineer, Liverpool. As the vessel left the ways she was named *Indrapura* in the customary manner by Miss E. N. Royden, Liverpool.

Steel Scow.—Mr. D. M. Cumming, Blackhill Dock, launched a steel scow for traffic on the Union Canal. Dimensions: 65 ft. 6 in., by 11 ft. 6 in., by 4 ft. 3 in. moulded.

LAUNCH.—Irish.

Briton.—On Saturday, June 5th, Messrs. Harland & Wolff, Belfast, launched the *Briton*, a twin-screw steamer of about 10,300 tons, the ninth which they have built for the Union Steamship Co. Her length is 530 ft.; breadth, 60 ft.; and depth, 40 ft.; and in design and arrangement she is much on the lines of the *Norman*, which has proved so popular in the service to the Cape, but, being of larger dimensions, permits of an enlargement of the state rooms, which are as admirably fitted as any to be found on the best class Atlantic liner. There will be accommodation for nearly 1,000 passengers. On the bridge, upper, and middle decks there will be quarters for 300 first-class, and on the middle deck for about 200 second-class, while in the poop, in rooms containing eight berths each, there will be accommodation for 120 third-class, and elsewhere open steerage accommodation for over 300. The first-class saloon is on the upper deck, and the library, drawing-room, and smoke-room on the promenade deck. All will be very finely fitted and elegantly furnished. The officers will have well-ventilated rooms, conveniently situated on the bridge deck. The engines are of the triple-expansion type, and the vessel will be the largest, fastest, and most powerful in the South African service. How rapid the development of our trade with this colony has been may be gauged by the size of the vessels engaged in it, although as matters stand there is no gainsaying that the means of communication are slightly better than the demand for them. In the line's first fleet, which was formed in 1854, but did not go into the Cape trade until three years later, there was a *Briton*—which was lost that year in the Bay of Biscay, while on a chartered voyage to Spain. A second vessel of the same name was built in 1861, and afterwards sold to Her Majesty's Government. The comparison of the dimensions of the three *Britons* cannot fail to be of striking interest, as showing the developments and progress made between 1854 and 1897:—

	Length.	Breadth.	Depth.	Tons gross.
Briton I.....	162·5 ft.	23·2 ft.	16·9 ft.	491
Briton II.	248 ft.	30·7 ft.	23·9 ft.	1,163
Briton III.....	530 ft.	60 ft.	40 ft.	10,300

A large number of people gathered to witness the launch. All the leading business centres of Great Britain were represented, and the gathering of men of almost every political opinion showed the general interest in everything concerning South Africa. Amongst those present were the Lord Mayor of Belfast, and Mrs. Pirrie; Sir Francis Evans, K.C.M.G., M.P., Chairman of the Union Steamship Co., and Lady Evans; the Marquis of Dufferin and Ava, P.C., K.P., and the Marchioness of Dufferin and Ava; Sir William Ewart, Bart.; the Countess of Shaftesbury; the Right Honourable John Young, P.C.; Mr. W. M. Farmer, Vice-Chairman of the Union Steamship Co., and Mrs. Farmer; the Rev. H. M. Williamson, D.D.; Sir James H. Haslett, M.P.; Dr. Rentoul, Q.C., M.P.; Mr. R. C. Munro-Ferguson, M.P., and Lady Helen Munro-Ferguson; Major R. G. Sharman Crawford, D.L.; Mr. Attewell; Mr. J. D. Barbour, D.L.; Sir William M'Cammond, J.P.; Professor Whitla, M.D., J.P.; Mr. Samuel Young, M.P.; the Right Hon. Thomas Sinclair, P.C.; Mr. J. Henniker Heaton, M.P.; Major-General W. E. Montgomery, D.L.; Mr. Walter Peace, C.M.G.; Mr. William Johnson, M.P.; Rev. Dr. Hamilton; Sir Daniel Dixon, D.L.; Mr. John Paddon; the Very Rev. the Dean of Connor, D.D.; Colonel Hart; Colonel M'Calmont, M.P.; Mr. Frank W. Ker, Mr. John Macpherson, Mr. Alex. Mitchell, Mr. Thomas Maltman, Mr. John M'Donald Mr. Thomas Holland, Mr. Joseph Reid, Mr. Abr. Harris, Mr. James Wilson, Mr. George Gordon, Mr. James Macfarlane, Mr. Hugh M'Bride, Mr. James Mitchell, Mr. George Fulton, Mr. David S. Ker, Mr. J. G. Couper, Mr. Mitchell, Mr. S. Sutherland and Mr. John M'Kenzie.

The weather was beautifully fine, and before the hour fixed for the floating of the boat visitors had plenty of time to run through the yard and note its excellent arrangement. Everything possible is used to facilitate unskilled labour, and for an establishment that has done practically no Government work the approximation to dockyard management is remarkable. On the *Briton's* left there is in frame one of the immense cargo vessels which the leading lines are now placing on the Atlantic, and beyond her the preparations are in progress for the building of the *Oceanic*, the leviathan White Star boat which is to bring the United States at least a day nearer the old country. The keel is almost all on the blocks, and the vessel's length will more than likely be over what rumour puts it. The arrangements for the launch of the *Briton* were under the direction of Mr. Carlisle, the yard manager, and exactly at the appointed hour the huge hull glided steadily down the ways and took the water in splendid style. As the great mass began to move Lady Evans broke the customary bottle of wine upon the bows, wishing the vessel good speed. Later in the afternoon Alderman Pirrie, the Lord Mayor of Belfast, entertained the launch party and a large number of local ladies and gentlemen at luncheon in the Ulster Hall, "to meet the chairman and directors of the Union Steam Ship Co., and to mark the great advance in naval architecture during Her Majesty's reign."

LAUNCH—German.

Meissen.—On June 4th the Flensburg Shipbuilding Co. launched from their ways a new screw steamer built for the Hamburg Austral Line in Hamburg. She has dimensions—403 ft. 8 in. by 47 ft. 8 in. by 31 ft., classed 100 A1 at British Lloyd's. The steamer was christened by Mrs. Adler.

LAUNCH—Norwegian.

Hildur.—On Saturday, June 12th, was launched from the yard of the Bergens Mekaniske Værksted, Bergen, Norway, a steel screw steamer of the following dimensions:—Length over all, 226 ft.; breadth, moulded, 31 ft. 6 in.; depth, 15 ft. 3 in. The ship is built to the highest class in the Norwegian Veritas, and has raised quarterdeck, bridge, and topgallant forecastle. Double bottom for water ballast in main and after holds and peak tank aft. steam steering gear, steam windlass, three steam winches, donkey boiler, &c. Every modern improvement has been embodied in her construction and outfit. She is built especially for the Baltic wood trade. The engines are triple compound, with cylinders 15½ in., 25 in., and 42 in. diameter, and 30 in. stroke. One steel boiler, constructed for a working pressure of 160 lbs. per square inch. Speed, 9 knots. The ship was named *Hildur*, and is built to the order of Rasmus F. Olsen, Esq., of this port.

TRIAL TRIPS.

Andria.—On May 22nd the steam yacht *Andria*, recently launched by the Ailsa Shipbuilding Co., Troon, ran her official trials on the Firth of Clyde. The machinery ran with great steadiness, and the results were most satisfactory, a mean speed of 14·66 knots per hour being attained on the runs between Cloch and Cumbrae lights. The *Andria* is owned by Mr. John E. Brooks, of New York and London; was designed by Mr. G. L. Watson, and engined by Messrs. D. Rowan & Son.

Earnest.—On May 24th H.M.S. *Earnest* went out for her official full-power speed trial in the presence of the Admiralty representatives. A mean speed of 30·19 knots was attained on the six runs on the measured mile, which were as follows:—

	Time. M. S.		Speed. Knots.
1st Mile	1 58½	....	30·38
2nd ,,	1 58½	....	30·38
3rd ,,	1 59	....	30·26
4th ,,	2 1	....	29·75
5th ,,	1 58	....	30·51
6th ,,	2 0	....	30·00

The speed for the three hours' continuous steaming was 30·12 knots. Mr. J. Welch and Mr. A. R. Emdin represented the constructive and engineering branches of the Admiralty. After the completion of the three hours' trial, the vessel was taken outside the Cumbrae Light to make her steering trials, all of which were carried out most satisfactorily. The *Earnest*, which has now concluded all her official trials, is the ninth Birkenhead 30-knot destroyer that Messrs. Laird Bros. have successfully passed through their official trials and delivered to our own and other Governments.

Britannia.—On Tuesday, May 25th, the saloon paddle-steamer *Britannia*, recently built by Messrs. Russell & Co., Port-Glasgow, for Captain John Williamson, went for a trial trip on the Clyde. The engines, which were made by Messrs. Rankine & Blackmore, worked without a hitch, giving entire satisfaction to both owners and builders, the absence of vibration in the engines being an earnest of comfort for the passengers. The speed attained was also most satisfactory, being in excess of that guaranteed. She has been purchased by the Hastings, St. Leonards-on-Sea, and Eastbourne Steamboat Co., Limited, of Hastings.

Walton Belle.—On May 27th the *Walton Belle*, a paddle-steamer which has been built at Dumbarton by Messrs. William Denny & Bros., ran her official trials on the Clyde. The vessel has been built to the order of the Belle Steamers Co., Limited, London, and is for their popular Thames service. The construction is to the Board of Trade requirements for the special service in which the vessel will be engaged. The hull is subdivided into nine watertight compartments, which practically secure her from foundering under any circumstances. Passenger accommodation has been provided in the usual handsome style of the company's steamers. The principal apartment is a social hall, brightly lighted by large windows all round. The framing is of polished wainscotting oak and sycamore with panels of linerusta, the ceiling being painted and gilded to harmonise. The first-class dining saloon is situated on the lower deck, and is divided into two apartments by a watertight bulkhead in which a watertight door is cut. The framing of this saloon is of yellow pine, artistically painted in tints. Another dining saloon is situated forward to supplement the main saloon when the vessel is crowded, and is finished in an up-to-date manner. A saloon for the convenience of second-class passengers is also fitted forward. On the main deck are two special private cabins. A feature of the vessel is the splendid promenade deck, on which are comfortable seats, arranged to act as life rafts in an emergency. The steamer has a bow rudder, with suitable steering-gear, for handiness in navigating the upper Thames. A powerful steam steering-gear by Bow, M'Lachlan & Co. is provided for the main rudder, which is controlled by a small wheel on the flying bridge. Electric light is fitted throughout, the installation being by the builders. The steamer is propelled by a set of direct-acting, triple-expansion, diagonal, surface-condensing engines, constructed by Messrs. Denny & Co. In order to secure a combination of lightness and strength, which is essential in high-speed work, cast and ingot steel have been used wherever practicable in the construction of the machinery, in place of cast and wrought iron. There are three cranks, giving the engine a very steady motion. The high-pressure and intermediate cylinders are fitted with piston valves, and the low-pressure cylinder with a double-ported slide valve, all being worked by Brock's valve gear, which ensures uniformity of lead at all grades of expansion. The reversing of the steamer is effected by Brown's combined steam and hand gear, all levers being brought to the starting platform, so that the engineer in charge has perfect control of the machinery at all times. A large marine boiler supplies the necessary steam, and has been built to the requirements of the Board of Trade. It is designed for a working pressure of 160 lbs. to the square inch, and is fitted with one of the builders' patent spark-catchers to prevent hot cinders being driven out of the funnel by the air pressure. The trials were run between Cloch and Cumbrae Lights, and gave a speed of 17·48 with the tide, and 16·69 against it—a mean speed of 17·09. The contract was for 16½ knots.

Sutton.—On May 27th the s.s. *Sutton* went down the river on her trial trip. After embarking a large party at Gourock, the vessel made the double run between the Cloch and the Cumbrae lights, when the expectations of the owners were fulfilled in all respects. The *Sutton* is 344 ft. long by 44 ft. beam, and carries 4,600 tons on a very limited draught. She was built by Messrs. A. Rodger & Co., Port-Glasgow, to the order of Messrs. John Sunley & Co., of London. The machinery of the *Sutton* consists of a set of triple-expansion engines, 22½ in. 37 in., and 61 in. diameter by 42 in. stroke, with two large single-ended boilers, built under Lloyd's and Board of Trade survey for a working pressure of 160 lbs. There are four large steam winches, and a large multitubular donkey boiler, the whole being arranged for expeditious working of the cargo. The machinery, which has been supplied and fitted by Messrs. Hall-Brown, Buttery & Co., has all the latest improvements for attaining maximum economy, including an evaporator, feed heater, &c. The vessel and machinery have been superintended during construction by Mr. James Pollock, of London, and Captain Pike, who is in command of the *Sutton*, has personally supervised the construction of the vessel. At the conclusion of the trial trip the *Sutton* left for Cardiff to load.

City of York.—On May 29th the *City of York*, which has been built to the order of Messrs. Robinson Brothers, of Whitby, by Messrs. John Blumer & Co., North Dock, Sunderland, was taken to sea on her official trial trip. The vessel has been built under special survey to Lloyd's 100 A1 requirements, her principal dimensions being 325 ft. by 47 ft. by 24 ft. 9½ in., moulded. The propelling machinery has been constructed by Messrs. Blair & Co., Limited, Stockton-on-Tees, the cylinders being 24 in., 40 in., and 65 in. by 42 in. stroke. The trial was successful in every way, the engines working throughout without a hitch.

Roebuck.—On May 31st the twin screw steamer *Roebuck*, which has just been completed by the Naval Construction and Armaments Co., Limited, Barrow-in-Furness, for the Great Western Railway Co., ran her official speed trials on the Firth of Clyde. The vessel has been built for the Channel Islands service of the company, and is specially designed to meet the very exacting conditions of that service. Her length between perpendiculars is 280 ft.; the beam 34 ft. 4 in., and the depth from the promenade deck 23 ft. 6 in. The passenger accommodation is complete, comfortable, and highly finished, and there are quarters for no fewer than 225 saloon and after-cabin passengers. In addition to the sleeping and dining cabins, there are deck saloons, smoking room, and ladies' deck cabins, and all over the ship everything possible is done to make the channel trip pleasant for passengers. The conditions of the specification as regards draught and speed were particularly arduous, the speed to be guaranteed being 20 knots on a continuous trial of three and a-half hours. On the trial this speed was easily maintained, the mean of four runs between the Cloch and the Cumbrae being 20¼ knots. The machinery consists of two sets of three-crank engines of the triple-expansion type. Steam is supplied at a working pressure of 175 lbs. per square inch by two double-ended cylindrical boilers, fitted with Howden's system of forced draught. The owners were represented by Captain Lecky, R.N.R., the marine superintendent of the company, and the builders by Mr. James M'Kechnie, chief of the engine department.

Griffon.—On June 1st H.M.S *Griffon* made her official full-power speed trials on the Clyde. Six runs were made on the measured mile, giving a mean speed of 31·21 knots, made up as follows:—

	Time.		Speed.
1st Run	2·0½	....	29·88
2nd ,,	1·59½	....	30·12
3rd ,,	1·59	....	30·26
4th ,,	1·59	....	30·26
5th ,,	1·59	....	30·26
6th ,,	1·59	....	30·26

The alternate runs were made with the tide, but against the wind which freshened very considerably from the north as the trial progressed. This accounts for the marked regularity of the speed. The speed realized during the three hours was 30·15 knots. After completing the miles, the vessel was taken outside the Cumbrae, but the considerable sea there was anything but conducive to a

high performance, clouds of spray breaking over the vessel as she maintained her contract speed of 30 knots despite the unfavourable conditions. After completing her speed trials, the usual steering trials, both at full speed ahead and astern, were carried out and completed successfully, and the vessel returned to the Albert Harbour, Greenock. The Admiralty were represented by Messrs. J. Welsh and A. R. Emdin, Devonport Dockyard, and the reserve by Messrs. Gregory and Deacon, Mr. Stone, the chief engineer of the vessel, being present; and the contractors, Messrs. Laird Brothers, of Birkenhead, by Mr. R. M. Laird, and Mr. R. Ratsey Bevis, jun. The *Griffon* having now completed the whole of her official trials successfully returned to Birkenhead on June 5th.

King Frederick.—On June 1st the new steel screw steamer, *King Frederick*, recently launched from the shipbuilding yard of Messrs. Short Brothers, Sunderland, for the King Line, Limited, of which Messrs. Phillipps & Co., 9, Gracechurch Street, London, are the managers, went on her trial trip with very satisfactory results. After a series of runs over the measured mile a mean speed of over 12 knots was attained. The dimensions of the vessel are as follows, viz.:—Length, 314 ft.; breadth, 44 ft.; and depth, moulded, 22 ft. 10 in. The engines, which have cylinders, 23 in., 37½ in., and 61½ in., with a stroke of 39 in., and two large steel boilers, working at 180 lbs. pressure, have been fitted by Messrs. Blair & Co., Limited, of Stockton. The vessel and engines are to the highest class in Lloyd's Register, and have been superintended during construction by Mr. W. B. Cumming, of Liverpool. The vessel afterwards left for Cardiff to load for the River Plate under command of Captain Taylor.

Waikare.—On June 1st the screw steamer *Waikare*, which has been built by Messrs. William Denny & Brothers, Dumbarton, for the Union Steamship Co., of New Zealand, went down the river on a trial trip. The *Waikare* is a vessel of 310 ft. by 41 ft. by 24 ft., and is built of steel to the register of the British Corporation. She has a shade deck aft, light bridge deck, and a forecastle deck, and is rigged as a fore-and-aft schooner. Her machinery, which is of the triple-expansion type, is of about 3,000 I.H.P. She carries about 2,000 tons deadweight. The saloon, which is on the main deck aft, is handsomely finished, the framing being of polished sycamore, and the upholstery in blue moquette in graded shades. There is accommodation for 150 passengers, and forward for 120 second-class passengers. The guaranteed speed was 14 knots, but on the light draught trial 14¾ was attained, and in the load trial 13¼.

Ruby.—On Wednesday, June 2nd, the new paddle steamer *Ruby*, the first of the two vessels which have been built by Messrs. John Jones & Sons, of Liverpool, under the superintendence of Messrs. Flannery & Tritton, consulting engineers, of Liverpool and London, for the Eastham Ferry and Hotel Syndicate, went for her official trial trip. The vessel, which is double-ended, has a length of 134 ft. by 22 ft. beam by 8 ft. 6 in. moulded depth. She is specially fitted up for ferry and pleasure service, having two handsome deck saloons and spacious upper deck. The engines are diagonal compound surface-condensing, and are supplied with steam from a large boiler of the marine type. The vessel is also fitted with Harrison's steam steering gear, steam windlass, and a complete installation of electric light. The draught of the vessel is limited strictly to 4 ft., with 500 passengers on board, and a speed of 12 miles is required. On the trial trip, the machinery worked smoothly at 50 revolutions, and the vessel, with the required weights on board, was 2 in. under the specified draught, and obtained a mean speed of 12·4 miles per hour, or ½ mile in excess of that specified. A large number of ladies and gentlemen were present, and the vessel, after completing her trial, proceeded to Eastham, where the guests were entertained at a lunch.

Clan Murray.—On June 3rd, the second of the Clan steamers—the *Clan Murray*—built by Messrs. William Doxford & Sons, Limited, left Pallion on her trial trip, and after a satisfactory run the vessel proceeded on her voyage.

Nordland.—On June 4th a new screw steamer, *Nordland*, went on her first trial trip. This steamer is built by the Flensburg Shipbuilding Co. for Mr. Alfred Christensen, Steamship Co., Nordsoen, in Copenhagen. Her dimensions are 260 ft. by 36 ft. by 18 ft 10 in., first division Veritas and special survey. Her engines are also built by the Flensburg Shipbuilding Co., and have a power of 775 H.P. The average speed on the trial was 10½ knots.

Rosabelle.—The new auxiliary composite yacht *Rosabelle*, recently launched by Ramage & Ferguson, Limited, Leith, and built for Theodore Pim, Esq., late owner of the yawl *Elfreda*, left the roads on Saturday, June 5th, for the south. This yacht has been built from designs supplied by Messrs. Cox & King, London, and in the opinion of yachtsmen who have seen her she is allowed to be one of the handsomest auxiliary yachts afloat. Her tonnage is 435, and her speed on trial 12 knots.

Abas Dadascheff.—On Tuesday, June 8th, the oil tank steamer *Abas Dadascheff*, built and engined by the Caledon Shipbuilding and Engineering Co., Limited, of Dundee and London, went through her official trial trips, which proved very satisfactory, and generally exceeded the guarantees. The Caledon Co. have in this instance shown their hand for quick execution of work, inasmuch that the vessel, although of a peculiar and special type, was launched under three months from the commencement of the contract, whilst the trial trip took place only nineteen days after that period, the vessel leaving Dundee the same day for St. Petersburg, at which port the builders give delivery. The vessel has been designed and built for the carrying of oil in bulk for trading in the Caspian Sea, between Baku and Astrachan, and she will proceed to her destination by way of the Volga. The dimensions of the vessel are—230 ft. by 32 ft. by 16 ft. moulded, fitted with triple-expansion engines constructed at the Caledon Co.'s Lilybank Engine Works, having cylinders 16 in., 27 in., and 44 in. by 33 in. stroke, fitted with a large steel boiler, working at 160 lbs. pressure, such boiler being fitted with injectors and pumps for oil firing. The bunkers are also constructed for this purpose; the ship carries about 1,250 tons of oil in bulk, on a draught of 12 ft. 6 in mean. In the poop of the ship accommodation is provided for about 20 passengers. The machinery is also fitted under the poop. Forward of this comes a longitudinal bulkhead, with six transverse bulkheads, coffer dams, &c., making in all eight separate tanks for the carrying of oil in bulk, each of which is connected with a powerful Worthington pump, the pumping installations being so arranged that the tanks can be filled and discharged either jointly or separately, as occasion might require, and each tank was severally tested under pressure. The pumping machinery has a total capacity of about 69,000 gallons per hour. She is built with a structural 'tween deck for the carrying of light cargoes, and is lighted throughout with electric light, and is also fitted with the usual cargo gear, winches, donkey boiler, &c. On trial the vessel steamed 10 knots, fully laden, with the engines running at 87 revolutions per minute, and a good head of steam was maintained by the boiler under coal fuel, although the boiler was especially constructed for oil fuel. This is certainly a record for Dundee, and speaks well not only for the builders, but the workmen at that port.

Sturton.—On June 10th the new steamer *Sturton* had her trial trip. She is a fine steel screw steamer, built by Messrs. William Gray & Co., Limited, to the order of Messrs. H. Samman & Co., of Hull, for the Sturton Steamship Co., Limited. The vessel has been built to Lloyd's highest class, and her dimensions are:—Length over all, 300 ft.; breadth, 42 ft.; depth, 21 ft. 9 in. She has a complete outfit for a first-class cargo vessel, including electric lighting. The engines have cylinders 21½ in., 35 in., and 58 in. diameter, with a 39-in. piston stroke. There are two large boilers working at a pressure of 160 lbs. per square inch. The vessel and her machinery have been built under the superintendence of Mr. Walter Sage, of Hull, and that gentleman, together with Captain Murrell, on behalf of the shipbuilders, and Mr. James Lindsay, of the engine works, was present at the trial. The results of the trial were highly satisfactory, and on its conclusion the vessel proceeded to Sunderland to load for Savona.

Metis.—On Saturday, June 12th, the s.s. *Metis*, a fine steel spar-decked steamer, built to the order of John Lockie, Esq., for the Venus Steam Shipping Co., by C. S. Swan & Hunter, Limited, of Wallsend, was taken to sea for her trial trip. The s.s. *Metis* has been specially designed for Mr. Lockie's trade, and will carry a deadweight cargo of 5,600 tons on a moderate daught. She will also carry a large measurement cargo of about 7,000 tons in addition to her bunkers. The whole of the accommodation for the passengers, captain officers, engineers, &c., is placed upon the bridge-deck in steel houses, thus economising all the space below and giving comfortable airy quarters for those on board. The crew are berthed in the topgallant forecastle as usual. The steamer is fitted throughout for water ballast including peak tank, and

she has a large outfit of powerful steam winches and discharging gear for obtaining the quickest possible discharge in handling cargoes. The steamer is also arranged so as to be available for carrying cattle, horses or troops. The machinery has been supplied by the North Eastern Marine Engineering Co., of Wallsend, and consists of a set of engines capable of developing 1,600 H.P.; the cylinders are 24 in., 40 in., and 64 in. by 42 in., supplied with steam by two extra large steel boilers, about 170 lbs. pressure. The *Metis* during her trial trip had only her bunkers and water ballast on board, but attained on the trial trip a speed of nearly 11 knots, the engines working perfectly smoothly and satisfactorily throughout the trial. The shipbuilders were represented on board by Mr. Rowland Hodge; the engine builders by Mr. D. Miles; whilst Mr. Lockie in his unavoidable absence was represented by Mr. P. Strange. Mr. Chaston who has superintended the construction of the hull and machinery, was also on board and expressed himself highly pleased with the arrangements of the steamer and the performance of the machinery. A goodly number of visitors assembled in the handsome saloon where luncheon was partaken of prior to leaving the vessel, immediately after which the steamer sailed for Cardiff where she will take on board a cargo for the East.

Oravia.—On June 12th the new mail steamer *Oravia*, which has been built for the Pacific Steam Navigation Co., left Belfast and proceeded on a trial trip down Belfast Lough. She is the ninth steamer constructed at the works of Messrs. Harland & Wolff for the same owners, and is intended to run in that company's line of mail steamers between Liverpool and the eastern and western ports of South America. Her dimensions are:—Length, 420 ft.; breadth, 48 ft. 6 in.; and her gross tonnage is about 5,500. She is supplied with triple-expansion engines. The ship, which was in charge of Captain Massey, commodore captain of the Pacific Co.'s fleet, had a numerous party on board, including Mr. R. Rankin, chairman of the Pacific Steam Navigation Co., and the Lord Mayor of Belfast. After a successful trial trip and adjustment of compasses the vessel left for Liverpool.

Port Albert.—On June 14th the fine new steel screw steamer *Port Albert*, built by the Tyne Iron Shipbuilding Co., Limited, Willington Quay-on-Tyne, to the order of Messrs. W. Milburn & Co., of London and Newcastle, for their Australian trade, proceeded to sea for her official loaded trial trip. The vessel has been built to the highest class at Lloyd's, and is of the spar deck type with long bridge, poop and forecastle. Her principal dimensions are as follows:—Length, 345 ft.; breadth, 46 ft.; depth, 27 ft. 2 in., and has exceptional facilities for the rapid loading and discharging of cargo. The machinery, which is of the latest type of triple-expansion engines, built by the North-Eastern Marine Engineering Co., Limited, at their Wallsend works, has cylinders 24 in., 40 in., and 64 in. by 45-in. stroke, supplied with steam by two large single-ended boilers, working at a pressure of 180 lbs. per square inch. The trial of both the vessel and machinery proved in every way satisfactory, a speed of over 10½ knots being attained. During construction the hull and machinery have been surveyed by Mr. R. Moffitt. The vessel proceeded on her voyage to Australia.

Nautik.—On June 14th the steel screw steamer *Nautik*, of 1,082 tons gross, built by Messrs. Carmichael, Maclean & Co., Greenock, for the Dampskibsselskabet Vesterhavet, Denmark, ran her official trial trip on the Clyde, attaining a mean speed of 10·436 knots on the measured distance at Skelmorlie. The engines supplied by Messrs. Hutson & Son worked smoothly, and the results were considered highly satisfactory. The *Nautik* is 225 ft. in length, breadth is 34 ft., and depth, moulded, 16 ft.; to carry 1,600 tons deadweight, and is classed 100 A1 at Lloyd's. Her triple-expansion engines have cylinders 17 in., 27½ in., and 44 in., by 33 in. stroke, for a working pressure of 160 lbs. The vessel is fitted with four steam winches, donkey boiler, steam windlass, steam steering gear, and all modern appliances for the working of cargo.

Brighton Queen.—On June 14th the paddle steamer *Brighton Queen* successfully completed her speed trials on the Clyde. The vessel has been designed and built by the Clydebank Engineering, and Shipbuilding Co., Limited, for the Brighton, Worthing and South-Coast Steamboat Co., Limited, with the view of increasing the facilities for excursions from Brighton and other ports on the south coast. The vessel has a certificate which will allow her to ply from the Thames to Plymouth, and also to cross the channel during the summer months. She is 250 ft. length over all and 28 ft. in width, but over the wings the extreme breadth is about 60 ft. In her construction everything has been provided which the skill of the builders and the experience of Captain Lee, who supervised the construction of the vessel, could suggest to make her thoroughly up to date. The hull is divided into ten watertight compartments, the bulkheads having no doors or other openings in them. A bow-rudder is provided for manœuvring quickly in the narrow channels at Newhaven and elsewhere, and a complete equipment of steering, docking, and mooring telegraphs, &c., has been provided. A promenade deck extends for nearly the whole length of the vessel, on which, besides the ticket office, chart-room, wheel-house, and captain's cabin, is a large smoking-room in a handsome teak deckhouse. To ensure perfect ventilation in the drawing-room a connection has been made with the forced draught fans, by means of which a current of pure air is delivered into the apartment. The machinery is of the well-known diagonal compound type, with cast steel entablature and steel shafting with separate condenser. Weir's independent feed pumps are fitted, also an evaporator and feed water filter. There is also a powerful steering engine, by means of which both the bow and stern rudders may be worked either together or separately. A complete installation of electric lighting has been carried out by the builders, including a search light at the bow. On the measured mile at Skelmorlie the mean speed was 18½ knots, and thereafter the vessel steamed down the Firth and maintained with the greatest ease the stipulated 18 knots. The whole of the auxiliary machinery, as well as the main engines, worked without any hitch, and with a complete absence of any unpleasant vibration. The *Brighton Queen* is undoubtedly an enormous advance upon any pleasure steamer plying on the south coast or in the English Channel, and her arrival at Brighton will mark an era in the excursion traffic of that district. It is noteworthy as an example of rapid construction that the vessel has been delivered to the owners in exactly 4½ months from the receipt of the order.

Ville de Valenciennes.—On June 15th the new screw steamer *Ville de Valenciennes*, built and engined by Messrs. John Readhead & Sons, South Shields, had a pleasant and successful trial trip off the Tyne. The steamer is of the spar-deck type, and her lines are designed more for securing speed and sea-going qualities than for large carrying capacity. Her length between perpendiculars is 274 ft., and she is 36 ft. broad and 24 ft. 8 in. deep, moulded, her deadweight capacity being 2,600 tons. The engines are of the triple-expansion type, having cylinders of 23 in., 37½ in., and 61½ in., with 39-in. stroke, and steam is supplied by two large steel boilers, working at a pressure of 160 lbs. The *Ville de Valenciennes*, which has the highest class at Bureau Veritas, and is intended for the general cargo trade between Dunkirk, Bordeaux, and Marseilles, has been built to the order of the Compagnie des Bateaux à Vapeur du Nord, Dunkirk—of which M. Verberckmoes is manager—under the superintendence of M. Frederick Morel, chief of the technical service. On her trial the vessel was run several times over the measured mile, and attained a maximum speed of 13¼ knots, everything passing off satisfactorily.

Russ.—On Tuesday, June 15th, the steel screw steamer *Russ* built by Sir Raylton Dixon & Co., Cleveland Dockyard, Middlesbrough, to the order of Mr. Adolf Carl, of Copenhagen, for Det Dansk-Russiske Dampskibsselkab, was taken out to sea for her official trials under the command of Captain Jensen. Her principal dimensions are:—Length, 325 ft.; beam, 43 ft.; depth moulded, 22 ft. 11 in., and has a deadweight carrying capacity of about 4,200 tons on 19 ft. 6 in. draught of water. She is built to British Corporation highest class single deck rule, and has water ballast in after peak and cellular bottom upper poop and bridge decks of steel, five watertight bulkheads, &c. Triple-expansion engines have been fitted by Messrs. George Clark, Limited, Sunderland, having cylinders 22 in., 36½ in., 60 in. by 42 in. stroke, supplied with steam by two large single-ended boilers, working at 160 lbs. pressure. During the trial trip everything passed off most satisfactorily to all concerned.

Sakkarah.—On Tuesday, June 15th, the s.s. *Sakkarah*, which has been built and engined by Messrs. Wigham Richardson & Co., Neptune Works, Newcastle-on-Tyne, to the order of the Deutsche Dampfschiffahrts Gesellschaft "Kosmos" of Hamburg, went for a very successful trial trip. The steamer is 385 ft. in length by 46½ ft. beam, and has well finished comfortable accommodation for a number of first and second class passengers and also for emigrants. The engines worked on the trial without the slightest hitch, driving the vessel at 12½ knots mean speed, and giving satisfaction to all concerned. The engines are of the

four-crank quadruple-expansion type, working at 210 lbs. pressure, and balanced on the Yarrow Schlick and Tweedy system. The owners were represented on the trial trip by Mr. F. Woegens and Mr. Freund, of Hamburg, and immediately afterwards the vessel left the Tyne under the command of Captain Piening.

Windsor.—On June 16th the steamship *Windsor*, recently built by Messrs. Ropner & Son, of Stockton-on-Tees, for Messrs. Evan Thomas, Radcliffe & Co., Cardiff, left the Corporation Wharf for her official trial trip, which was made during the day in the Tees Bay, and notwithstanding the strong gale blowing at the time, proved satisfactory in every way. The steamer is of about 6,000 tons deadweight, and is fitted with the builders' patent trunk. She has been constructed and fitted out under the supervision of Captain Hesketh, of Cardiff, and Mr. F. D. Price, of Newcastle. The machinery has been supplied by Messrs. Blair & Co., Limited.

Albina.—On Thursday, June 17th, the *Albina*, a small steel screw steamer, which has been built and engined by Messrs. Wigham Richardson & Co., at their Neptune Works, Newcastle-on-Tyne, to the order of the Dutch Colonial Government for their service in Dutch Guiana, went for a very successful trial trip. The vessel is 124 ft. in length by 22 ft. beam, and has a very light draught of water to enable her to ascend the rivers on her station. She has very comfortable accommodation for a good number of passengers. All throughout the trial machinery worked without the slightest hitch, propelling the vessel in spite of the unfavourable weather at a speed of over 10 knots, and giving complete satisfaction to Mr. Boon and Mr. J. de Bruyn Kops, representing the Dutch Colonial Government.

Reindeer.—On June 21st the twin-screw steamer *Reindeer*, built by the Naval Construction and Armaments Co., Limited, for the Great Western Railway Co.'s service to the Channel Islands, completed her trials on the Firth of Clyde. The vessel is a sister ship of the *Roebuck*, and the speed guaranteed was 20 knots on a continuous trial of 3½ hours. On a series of runs between the Cloch and Cumbrae Lights the guaranteed speed was easily exceeded. The engines worked smoothly, and there was practically no vibration. After coaling at Greenock the *Reindeer* left the Firth for Milford Haven.

White Queen.—On June 21st the steam yacht *White Queen*, built by Messrs. John Duthie, Sons & Co., Aberdeen, for Mr. Stewart, Calcutta, went on her trial trip. The vessel, which is in command of Captain Wallace, ran the measured mile and attained a speed of about 13 knots an hour.

Mandolin.—The steam yacht *Mandolin*, 184 tons, has just been completed by Ramage & Ferguson, Limited, Leith, for A. Lifford Hewitt, Esq., London, the speed obtained on the trial trip being 11 knots.

Gaviao.—The composite steamer *Gaviao*, built by Ramage & Ferguson, Limited, for Messrs. Blandy Brothers & Co., Madeira, which has finished her trials, obtained the highly satisfactory speed of 10½ knots on the measured mile.

Rover.—Lately Messrs. Hepple & Co., of South Shields, have completed a passenger paddle steamer, named the *Rover*, for the Glasgow and Greenock Steam Shipping Co., intended for the passenger service from Londonderry to Moville. The hull of the vessel was built by Messrs. Eltringham & Co. The *Rover* is 108 ft. long, and 18 ft. 9 in. in breadth, the engines giving an I.H.P. of 500. When taken to sea the vessel maintained an average speed of 11 knots per hour.

Middleham Castle.—Lately the new steamer *Middleham Castle*, built by Messrs. William Pickersgill & Sons, Southwick, was taken to sea on her trial trip. The vessel, which has been built to the order of the Lancashire Shipping Co., Liverpool, is of the long partial-awning deck type. Her principal dimensions are:—Length, 325 ft.; breadth, 42 ft. 6 in.; depth, 21 ft. 9 in., and she will take Lloyd's highest class for vessels of this type. The machinery and boilers have been supplied by Messrs. George Clark, Limited, the engines, which are of the triple-expansion type, having cylinders 21½ in., 36 in., and 66 in. diameter, with a stroke of 42 in., and the two large steel boilers are 14 ft. 4½ in. by 10 ft. 6 in., with a working pressure of 180 lbs. to the square inch. During her trial the ship and engines gave every satisfaction, the average speed of 12 knots being attained on a two hours' run.

Ben Nevis.—Lately the steel and iron screw trawler *Ben Nevis*, built to the order of the North British Steam Fishing Co. Limited, Aberdeen, has had a satisfactory sea trial. The vessel is classed to Lloyd's 100 A1 requirements, the dimensions being 95 ft. by 19 ft. by 11 ft., the engines having cylinders 16 in., 33 in. by 22 in. stroke, and the boilers 10 ft. by 10 ft., 120 lbs. pressure. The hull and boiler are of Messrs. J. T. Eltringham & Co.'s construction, the machinery being supplied by Mr. Geo. T. Grey, of South Shields.

Reviews.

The British Mercantile Marine, a short Historical Review. By Edward Blackmore. London: Charles Griffin & Co. 1897.

The editor of the nautical series has made a very interesting and valuable contribution to his library. His book opens with a rapid *resume* of the development of British shipping from the earliest times. After a glance at the Elizabethan period and the causes which led to the development of our oversea commerce at that day, we are brought to the time of the accession of our present sovereign. Captain Blackmore shows us how, at this period, the philanthropists who had just succeeded in abolishing slavery, turned their attention to the mercantile marine, which, if anything of the charges brought against it were well founded, was in a very evil plight. There were no regulations as to the examination of officers, and legislation as to life-saving appliances, and as to trim and management of vessels were as yet undreamt of. The only matter, as far as one can see, to which the State did turn attention was the measurement of capacity. Even this was done on wrong principles, and its effect was to encourage bad types of ships, and so to aggravate the condition of things. Foreign ships were better built and better manned and better found. Such a state of things was bound to cause a reaction, and to-day no one can complain that there is insufficient legislation on shipping matters in this country.

The development of steam, and the effects of the Russian and American wars on our Mercantile Marine are all followed out. The institution of Board of Trade Inquiries into shipping casualties is noticed. One of the results of this departure was the institution of the Shipmasters' Society, of which Captain Blackmore was for some years chairman. We may take it, too, that the Institute of Marine Engineers also owes its existence in part to the fact that deck officers' societies were found to do good work for their members.

A second part of the volume is devoted to the discussion of the *personnel* of the service. Here Captain Blackmore takes rather a gloomy view, though we are by no means sure that he is not warranted by facts in thinking that something immediate and far-reaching must be done to restore our decaying industry. Captain Blackmore recognizes the growing importance of the engineering branch, and feels that they have many advantages in their training over the branch to which he himself belongs. He advocates for the improvement of the navigating branch a new system of State-aided apprenticeship, and a simple examination for young sailors. That something of this kind is necessary few will deny in view of the constantly increasing numbers of foreigners employed under the red ensign. The thoughtful contribution of Captain Blackmore will show the views of an educated and experienced seaman, and thus indicate the line taken by the best class of those who are entitled from experience of the British deck hand to express their views on a matter which is certainly of pressing national importance.

The Engineers' Year Book of Formulæ, &c. By H. R. Kempe, A.M.I.C.E., &c. London: Crosby Lockwood & Co. 1897.

This is the fourth issue of this now world-wide publication. Each of the four issues now given to the public has been an improvement on those which have preceded. This is not to be wondered at, for experience shows, even to such a practical man as the Engineer-in-Chief to the Post Office, that certain formulæ are less of public value than it was at first considered they were. Thus, as time goes on, these matters fall out to be replaced by others which the development of certain branches of the science brings into prominence. Besides all this, there is, of course, the continual improvement of the tables themselves, which cannot, at first, be always absolutely free from slight and typographical errors. But it seems hard to see how further issues can improve on the present one.

The railway part of the volume has this year had very considerable attention paid to it. The locomotive section has been re-written by Mr. George Hughes, of the Lancashire and Yorkshire Railway, whilst the information relating to tunnels, earthworks, and curves have been elaborated and revised. The important subject of electricity, which is so much comparatively younger in its practical aspect than steam, is, of course, more subject to change on that account. So experts have re-written the article on electric tramways, and the important question of electric welding is now for the first time treated. In the marine section—which is to our readers the most interesting—we have facts and figures relating to three important types of water-tube boilers, viz., Thornycroft, Yarrow, and Belleville. At page 549 there is a small table which is, to us, somewhat incomprehensible. It is headed "Grate Areas and Heating Surfaces of various Weights (including water and all fittings) of Belleville water-tube boilers." Then follow the names of the *Himalaya* of 1854, with her namesake of the modern P. & O. fleet as well as of an older White Star steamer, and of several British men-of-war. The weight of the boilers and the areas of their surfaces are given. As far as we are aware none of these vessels ever were fitted with Belleville boilers. The statistics here exhibited are afforded by Messrs. Maudslay, Son & Field, who are British agents for the Belleville patents. Perhaps they will explain what it all means.

A good deal of information as to turbines is given. Next year we shall hope to see some recognition of the researches of Mr. Parsons in his valuable experiments with the *Turbinia*, which have, of course, been published to the world since the present volume left the publishers' hands.

Miscellaneous.

Messrs. T. Richardson & Sons, the well known Marine Engineers of Hartlepool, have added an electric power branch to their already extensive business, and have concluded an arrangement for the sole representation of Messrs. Brown, Boveri & Co., of Baden, Switzerland, in this country. Messrs. Richardson will be advised on all electrical matters by Mr. C. E. L. Brown, head of the firm of Messrs. Brown, Boveri, who is well known in connection with the Electrical Exhibition at Frankfort in 1891, when he designed and executed successfully the scheme for transmitting power on a commercial scale from a water-power station at Lauffen on the Neckar to Frankfort, a distance of 100 miles. Mr. Brown has also designed and executed power plants of upwards of 100,000 H.P. in all parts of the world, so that his valuable assistance will at once place Messrs. Richardson in the front rank amongst electrical power engineers. Arrangements have also been made whereby Messrs. Richardson are licensed to manufacture under the various patents of Mr. Nikola Tesla, whose inventions have given electric power such a great impetus in America. The electrical department will be managed by Mr. C. F. Higgins, late chief electrician to Messrs. Brown, Boveri, and who is at present superintending the completion of the installation by which Messrs. Richardson's large works will be driven.

Torpedo Boats.—The Austrian Government have placed a contract with Messrs. Yarrow & Co., of Poplar, for four first-class torpedo boats of the improved *Viper* type.

Iron and Steel Institute.—The autumn meeting of the Iron and Steel Institute will be held at Cardiff on Tuesday, Wednesday, Thursday, and Friday, August 3rd, 4th, 5th, and 6th next. The meetings on August 3rd and 4th will be held, by kind permission, at the house of the South Wales Institute of Engineers, Park Place, Cardiff. The programme will embrace visits, on August 3rd, to the Bute Docks, the Cardiff-Dowlais works, and to other works in the vicinity. On August 4th Penarth Docks and other works on the Taff Vale Railway will be visited; and on August 5th a visit will be made to the Dowlais and Cyfarthfa Steel Works. On Tuesday evening, August 3rd, the Worshipful the Mayor of Cardiff will extend his hospitality to the members of the Institute and the ladies accompanying them, by inviting them to a reception at the Free Library, Art Gallery, and Museum Building. On Wednesday, August 4th, the members and ladies accompanying them will be invited to a ball by the Most Honourable the Marquis of Bute, K.T., and the Marchioness of Bute. On Thursday, August 5th, the members and ladies accompanying them will be invited by the local committee to a Welsh concert at the Park Hall. The members will be invited to luncheon by the Monmouthshire and South Wales Coalowners' Association on August 3rd; and on August 4th by the president of the Cardiff Chambers of Commerce, the Right Honourable the Lord Windsor. On August 4th they will also be invited to dinner by the directors of the Taff Vale Railway Company. On Friday, August 6th, there will be a whole day excursion for ladies and gentlemen to points of interest in the neighbourhood. The chairman of the Local Reception Committee in Cardiff is Sir William T. Lewis, Bart., member of Council of the Iron and Steel Institute; and the honorary secretary is Mr. T. Hurry Riches, M.Inst. C.E., of the Taff Vale Railway, Cardiff. A Ladies' Committee will be formed to make arrangements for ladies accompanying members, to visit the various places of interest in and around Cardiff.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from May 13th, to June 8th, 1897.

11835 R. Campbell, W. and S. G. Railton. Valves.
11870 F. S. Pett. Cargo-transporting apparatus.
11874 M. J. Adams. Engines.
11879 R. L. Barker. Packings for piston-rods.
11909 R. Goulding. Steam vessels.
11951 M. A. Lamy and C. Richard. Internal combustion engines.
12081 T. G. Challis. Propulsion of ships' boats.
12113 S. Richards. Life-belts.
12117 A. J. Pool. Engines.
12139 J. Coulthurst. Steam boiler furnaces.
12142 E. Barnes. Friction clutches.
12168 F. Ljungstrom. Sails.
12189 S. Pattisson, W. C. Windover and W. C. Evans. Internal combustion engines.
12201 E. Bennis. Steam boiler furnaces.
12224 D. N. Fleming. Preventing corrosion of boilers.
12226 W. B. Thompson. Ships.
12232 J. S. Pool, H. Austin, G. H. Pool and A. F. Williams. Steering steamships.
12247 G. Walker and A. H. Mitchell. Ships' logs.
12260 E. M. Johnson. Armoured vessels.
12269 T. G. Bowick. Propelling ships.
12278 J. F. de Navarro. Steam boilers.
12283 H. H. Lake. (The Ingersoll-Sergeant Drill Co., United States). Slide valves.
12297 W. H. Parker. Indicating the draught of vessels.
12316 E. D. Bargs. Marine engine governors.
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13932 D. Jones, J. C. Odell, and R. B. Caldicott. Steam engines.
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Wickstead, J. B. 1C London
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June 12th, 1897.

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Dixon, T. . . . . 2C N.Shields
Farrar, W. H. . . 2C Hull
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The Marine Engineer.

LONDON, AUGUST 1, 1897.

THE preceding month has been signalised by an act of international courtesy most ably carried out by the Institution of Naval Architects, which was fitly designated as an International Congress of Naval Architects and Marine Engineers. It is such international courtesies as these, set in motion by private individuals, from sheer good fellowship to their foreign brethren of cognate professions, admirably supplemented, as such efforts always are, by the personal support and presence of H.R.H. the Prince of Wales and other members of the Royal Family, that will go far to cement that brotherhood among diverse nations, which all lovers of peace and goodwill amongst men would wish to see. The Institution of Naval Architects, desiring to cement the cordial friendship evinced to their body by their French and German *confréres* in former years, welcomed, by especial invitation, such a large body of naval representatives—naval architects and marine engineers—from all the neighbouring Continental states and also from America, as to give a truly international character to their Congress. And this effect was further enhanced by the large number of ladies accompanying the visitors to the Congress. The Congress was appropriately opened by the Prince of Wales in person, as Honorary President, supported by the Rt. Hon. G. J. Goschen (First Lord of the Admiralty), the Dukes of Saxe-Coburg and of York, and by the Earl of Hopetoun (President of the Congress), in the Imperial Institute, which magnificent range of buildings and adjoining gardens and pavilions added much to the *coup d'œil* of the reception of the honoured guests and to their subsequent enjoyment after the serious business had been completed. The babel of foreign tongues was quite a characteristic of the meeting when used in ordinary conversation, but the evident success of the papers read, of the speeches, and of the earnest business transacted, was a strong confirmation of the axiom that English is known and understood throughout the world as a business tongue. Elsewhere we give a more particular account of the proceedings of this great Congress, in which, it is to be observed, that marine engineers, perhaps for the first time, were recognised as a body who are fast taking a foremost position amongst the scientific professions of the age, and publish *in extenso* some papers selected as most appropriate to our readers, whilst the limited space at our command forbids more than a cursory glance at many other papers read before the Congress of most interesting and important character.

SIR ALBERT J. DURSTON, Engineer-in-Chief to H.M. Navy, and J. T. Milton, Esq., Chief Engineer of Lloyd's, collaborated in reviewing the history and progress of marine engineering in the Royal Navy and the Mercantile Marine from the foundation of the Institution of Naval Architects to the present date, and divided such progress under the two heads of theoretical knowledge as to principles and the practical carrying out of the same in increased efficiency. In the first part of the subject the highest credit was given to J. Macquorn Rankine, to Hirn, Cotterill, and others for being the main pioneers of the principles affecting the economical use of steam at high grades of expansion, but these principles had to be carefully worked out by direct experiment, and had to be supplemented by investigations into the reduction of liquefaction during the expansive working of steam, by subdividing the range of expansion in two or more distinct and successive cylinders. Credit is given to the names of Joseph Maudslay, John Penn, senr., the Napiers, Scott Russell, Kirk, Sennatt, and others, many of them living and active members of the Institution, for their labours in this respect. The steps of practical advances may be summed up thus: The permanent introduction of the surface condenser and consequent general rise of steam pressure; the adoption of the cylindrical boiler and consequent further rise of pressure; the successful re-introduction of the compound engine; the adoption of twin-screws; the introduction of the triple and further graded expansion engine; and finally the adoption of water-tube boilers. These successive means for the practicable increase of boiler pressure have been accompanied by a steady rise of piston speed and speed of revolution, an improvement in design generally, in the distribution of steam, and in the balancing of working parts. These advances have been made possible as regards better and stronger material, by simultaneous improvements in the allied iron and steel trades, such as the Siemens furnace and resulting mild steel, corrugated furnaces, improved means, such as hydraulic presses for dealing with large forgings, the production of high-class steel and iron tubing; and last, but not least, the perfection of various forms of packing for glands and cocks to meet the higher steam pressures. The Royal Navy is credited with having kept well in the fore-front as compared with the Mercantile Marine in such steps of improvement. The rise of I.H.P. in effective steam ships in the Royal Navy has been from 450,000 in 1859 to 1,900,000 in 1897. The rise of boiler pressure has been from 10 lbs. per square inch in 1845 to 300 lbs. per square inch in 1897. The rise of piston speed has been from 445 ft. per

minute in 1861 to 900 in first-class cruisers and 1,220 in destroyers in 1897. The rise of speed of revolutions has been from 55 revolutions per minute in battle-ships and 100 in gunboats in 1860 to 217 in third-class cruisers and 410 in destroyers in 1897. These facts show most emphatically the energy and enterprise that has always characterized the engineering staff of the Royal Navy.

The battle between armour and projectiles is still being waged as vigorously as ever, and the Institute of Naval Architects is fulfilling one of its most important functions by some of its members in recording and analysing the results of the conflict from time to time. Monsieur L. E. Bertin contributed to the Congress a closely analysed and mathematical record of the resistance of Harveyed plates as compared with Creusot and other steel plates. He points out that the function of the Harveyed plates is to break up the ogival heads of the shot and shell, and when combined with a sufficient thickness of plate and backing, as compared with the impact of the shot or shell, such breaking up of the projectile is generally effected with an absorption of the momentum of the projectile. Under favourable conditions for the plate it would appear that the Harveyed plates have supported the contention for their adoption, that they increase the resisting power of armour by fifty per cent. It appears also to be very certain that projectiles which are too weak to seriously penetrate armour produce much smaller indentations when the latter has been Harveyed. We are not certain of stopping the projectile in the wall when the ratio of the thickness of the plate strictly perforated to the thickness of the plate alone exceeds 1·4 for the plate alone. The results as a whole are not encouraging to the manufacture of non-Harveyed plates, but as a consequence of some least unfavourable results with plain steel plates some manufacturers still hope to compete without having recourse to Harveying. A comparatively soft plate will absorb a large portion of the blow by permanent deformation, but the inflexible surface of Harveyed plates does not lend itself to permanent deformation, and only flies into fragments around the point of impact. The cause of the rupture of the ogival head of a shell and the means of preventing it require delicate consideration. A rigid metal such as chrome steel is apt to fly under the irregular compression of the head as compared with the body. A remedy has been sought in the use of a flexible and ductile envelope-capped projectile, and also the Wheeler-Sterling projectile has proved successful in bearing collision without fracture. It is probable that the progress in the manufacture of projectiles suffices to counteract the improvements in plates due to Harveying, but there will still remain an incontestable improvement in defensive structures as compared with older ones. To the great benefit of naval architecture, we now know how to protect ourselves better with a less weight of armour.

The science of naval architecture, like that of marine engineering, as above referred to, has been progressing over wider and more analytical grounds during the life-time of the Institute of Naval Architects, and an interesting account of such progress was given to the Congress by Sir Edward J. Reed, who himself has borne no small share in such advancement. Sir Edward divides the theory of naval architecture into three divisions: (1) The science which deals with the strains to which ships are subjected at sea, and the provision of the strength necessary to withstand them. (2) The science which regulates the dimensions, forms, and weights so that vessels may float under all conditions with due displacement, draught of water, and stability; and (3) The science which provides for so adapting form to fluid resistances that vessels may be propelled either by external or by internal forces, with due economy and security. It would appear that little had been done to analyse, from actual examples, the strains upon the upper works of large vessels until 1869, until Sir Edward Reed, with the able assistance of Sir William White, then a member of the staff, and the lamented W. John, systematically analysed the possible maximum strains, with results somewhat unexpected as to maximum tension per square inch upon the upper works of large vessels, which results were embodied in papers to the Institute of Naval Architects in 1874 and 1877. A following paper in 1880, by Professor Jenkin, was of much value in enabling quantitative values to be assigned to the steering stresses exerted at sea upon various parts of the ship's section. Under the second heading it would appear that there is some confusion between various scientists, and between the English and French naval architects in the general and irregular use of the term meta-centre, and it is suggested that this term should apply only to points actually situate in the original upright axis of the ship. The term stability is also open to question as to exact definition, as in some cases a vessel may have a negative meta-centric height for a small angle of inclination and thereafter a righting moment, which, however, only tends to return her towards, and not to an upright position. If a righting movement is also considered as equivalent to the term stability, we have the anomalous condition that a vessel of great stability, when disturbed from rest, has no active stability at all when she is upright. It

is suggested that an improved nomenclature avoiding these apparent incongruities might be of value for the better appreciation of arguments or evidence with judges, counsel, marine officers, or even members of Parliamentary committees. Low freeboards entailed much greater care in the investigation of curves of stability under all extreme circumstances, and the loss of the *Captain* and the capsizing of the *Daphne* on the Clyde during launching, enforced the necessity of careful analysis as to stability in entirely new conditions as regards modern vessels. Too much up to that date had been assumed, which on close investigation proved to be erroneous under the new conditions of ship-building. The dangers of both excessive and deficient immersion have to be guarded against. As to the theory of ship resistance, it would appear to have completely changed since the foundation of the Institute of Naval Architects. The excavation theory has given way to the theory of surface friction. Hence resistance is estimated as now proportional to the wetted surface and not to the transverse sectional area of the vessel, and excess of resistance at higher speeds is largely due to wave making. We may observe the effect of the skin friction resistance in the belt of eddying water which clothes the surface of the ship from end to end, getting thicker as it approaches the stern. The effect of wave-making resistance is observed in the wave system spreading away from the ship, and direct wave-making resistance in the train of large but long undulating waves that follow in the wake of the ship. In the investigation and analysis of these most interesting branches of naval science all nations have joined and worked together without rivalry or jealousy.

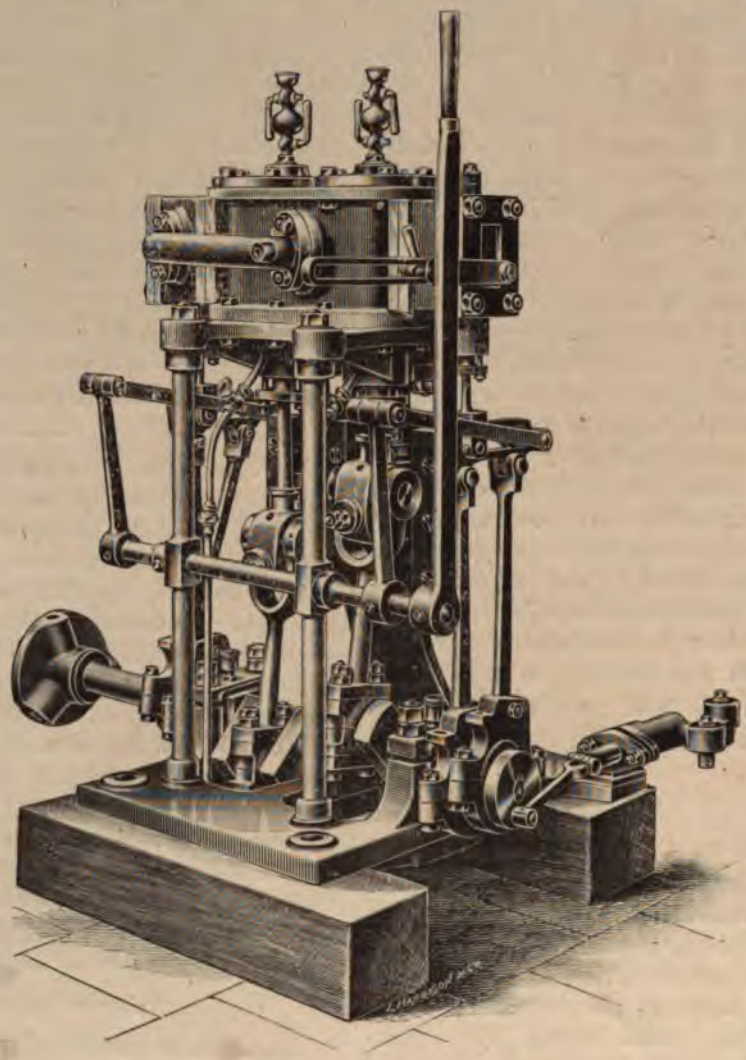
Practical development in mechanical science is often greatly aided by the laboratory researches of professors, and Professor H. S. Hele-Shaw, of University College, Liverpool, has been doing valuable service to engineers and naval architects by his investigations into the nature of the surface resistance in pipes and on ships, which formed the subject-matter of a communication to the International Congress of Naval Architects and Marine Engineers. The main difficulty hitherto encountered in all such experiments has been the devising of some method to make liquid currents at high speeds visible and capable of photographic reproduction. At high speeds colouring matter seems to be useless for the purpose, as the colour immediately mixes with the liquid, and foreign bodies, which will not mix, such as sand or spermaceti, accummulate in places where eddies are formed and vitiate the results. Professor Hele-Shaw has discovered that the induction of air bubbles into the liquid streams to be observed, admirably fulfil the purpose of showing the course and relative speeds of different portions of liquid travelling past or about obstructive bodies or impinged upon them. The Professor has photographically reproduced the course of liquid streams passing an egg-shaped section, which may represent the hull of a vessel, when either the blunt or sharp end faces the current. Other experiments show the course of the current when a projection representing a rudder is either steady in the axis of the hull or hard over. The effects also of a jet at various velocities upon the opposing flat face in various positions or upon an irregular form. And further the flow of a liquid through pipes in which an obstacle has been placed is graphically shown. So far it may be assumed that the problem of how to represent and graphically reproduce the nature of the currents, their velocity, their eddies, and their vortices, has been most admirably solved by these experiments, and the practical deductions from and utilisation of these experimental facts is now for the naval architects and marine engineers to carry out.

Mr. J. Johnson gives the Congress the advantage of many years investigation into and use of a formula that he has devised for approximating hull weights in a rapid and prompt manner. He uses Lloyd's longitudinal number, modified in certain particulars to suit certain classes of vessels, and he expresses by a simple formula which he has found to be most satisfactory in its approximate accuracy, the finished weight in tons of iron or steel used in the construction of the hull in terms of the said Lloyd's longitudinal number multiplied by a co-efficient varying slightly for certain types of vessels, limited to five, and raised to a certain power varying from 1·3 to 1·4 for the said various types. This should much reduce the labour of the naval architect in arriving quickly and with reasonable accuracy at the weight estimate of a ship from its proportions and dimensions.

IMPROVED COMPOUND LAUNCH ENGINE.

THE Ardwick Engineering Co., yacht and launch engine builders, Bennett Street Ironworks, Ardwick, Manchester, are introducing an improved compound launch engine, the "Compact,"—of which we give an illustration. The cylinders in this engine are in one casting, with receiver cast in between. The high-pressure cylinder is 2½ in. diameter, and the low-pressure 4 in. diameter, with 4 in. stroke. All the parts are strongly proportioned, and special attention has been devoted to the provision of large bearing surfaces. These engines are suitable for all classes of boats up to 25 ft. in length, and they are

tested under steam before leaving the works. They can be supplied with jet, surface, or outside condensers. The chief advantages of these engines are compactness and neatness of design, the dimensions being 3 ft. high, 3 ft. from outside end of shaft to coupling, and 2 ft. wide. Ease of access to all working parts is also a noteworthy feature in the "Compact" engine. Altogether, this improved design of launch engine is a very effective pattern, and admirably adapted to the purpose for which it has been introduced. The company have recently supplied three of these engines for the Colonies—two for Sydney, and one for British Columbia, a couple of these being for 20 ft. boats, and the other for a 25 ft. boat. The company make engines of a similar type to the one illustrated, from 1½ H.P. nominal to 10 H.P., and also make small steam engines of both vertical and horizontal type for special requirements, besides gas engines, lathes, cold sawing machines, drilling machines, steam hammers, and other work of a general engineering character. In all their special engines and tools they have a large foreign and colonial connection.



Improved Compound Launch Engine.

POPE'S IMPROVED GLOW LAMPS.

MESSRS. E. GOOSSENS POPE & Co., of 17, South Castle Street, Liverpool, have placed on the market a new form of electric incandescent glow lamp, which appears to be a marked departure from the usual lamp which has been in use for so many years past.

It is well-known that the old method of filling the cap of the lamp with plaster of Paris has often led to defective insulation, entailing waste of energy, and consequent loss and sometimes extinction of light. In the lamp shown in the adjoining illustration, which is the invention of Mr. Pope, who was known for so long in connection with the Swan Company, it will be noticed that in place of the usual cap filled with

pluster, a metal ring is arranged, which is blown on to the glass. On to this metal ring the metal cap is soldered in such a way as to leave an air space in the interior of the cap, which forms the means of insulation.

It is claimed by the inventor that the caps are absolutely damp-proof, withstand vibration, and are suitable for fixing where there is much machinery. Hence the lamps are particularly applicable for use on board ship. It is also stated that the risk of short circuiting in the lamp is overcome, that the candle power is better maintained, and a longer average life

is obtained. In reference to the maintenance of candle power, it may be added that as the result of experiments it has been shown that during their life the lamps do not lose more than 10 to 15 per cent. of their initial candle power.

By the use of this improved construction cap the lamps are kept cooler when burning, and the risk of the glass being broken at the place where the leading-in wires are situated is reduced to a minimum.

A lamp which can fulfil the claims that are made with regard to this particular lamp, should meet with much appreciation from those interested in shipping in which electricity is used as a medium for lighting purposes.

INTERNATIONAL CONGRESS OF NAVAL ARCHITECTS AND MARINE ENGINEERS.

THE Congress which was convened by the Institution of Naval Architects assembled on Monday, July 5th, at a brilliant Conversazione held at the Hotel Cecil in the Strand.

The two largest halls of this palatial hotel were reserved for this purpose, and the string band of the Royal Artillery gave selections of music during the evening. The guests and the members were received by the President, the Right Hon. the Earl of Hopetoun, G.C.M.G., and the Council of the Institution.

There was a very large attendance. Besides a large number of the English, Scotch, and Irish members, there were also representatives from Argentina, Austria-Hungary, Belgium, Brazil, Chili, Denmark, France, Germany, Holland, Italy, Japan, Russia, Spain, Sweden, China, and the United States of America.

On Tuesday, July 6th, the Congress assembled at the Imperial Institute, where it was formally opened by H.R.H. the Prince of Wales, the Honorary President of the Congress, who delivered a speech of welcome. The First Lord of the Admiralty, the Right Hon. George J. Goschen, M.P., then delivered an address, which was followed by the inaugural address of the President, the Earl of Hopetoun, which was as follows:—

MAY IT PLEASE YOUR ROYAL HIGHNESS,

I desire to tender to your Royal Highness the respectful thanks of this Congress for the gracious address of welcome which you have, on behalf of Her Majesty the Queen, as well as on your own behalf, been pleased to deliver. We are very sensible of the privilege which we enjoy in having your Royal Highness as our Hon. President, and we are intensely grateful that your Royal Highness should, in the midst of the many duties which, at this time especially, devolve upon you, have so graciously found ime to be present to-day, and to speak to us, as you have done, in a manner so encouraging and so full of approbation. We wish to assure your Royal Highness that the kindness which you have shown us will not be misplaced, but that the recollection of it will brace our members to fresh efforts in the cause of the great sciences of shipbuilding and marine engineering, twin sciences which have done so much during the last sixty years to promote the growth of good feeling between nations, and which have added so greatly to the comfort and prosperity of the peoples of the world.

We are also highly honoured by the presence of their Royal Highnesses the Duke of Saxe-Coburg-Gotha and the Duke of York. The Society in whose name I speak was founded amongst other reasons to enable those who build ships and those whose mission it is to use them to meet together and exchange ideas. It is, therefore, specially gratifying to us to respectfully greet their Royal Highnesses, not only as illustrious members of our Queen's family, but also as distinguished naval officers, as practical seamen and experts in the knowledge and usage of ships.

YOUR ROYAL HIGHNESSES, LADIES, AND GENTLEMEN,

We are grateful to the First Lord of the Admiralty for coming here to-day. We thank him both in his own individual capacity, and as representing Her Majesty's Government for the countenance and support which he has extended to us, and for the cordial welcome which he has, on behalf of himself and his colleagues, offered to our guests.

It is now my pleasing duty to offer, on behalf of the Institution of Naval Architects, a very warm welcome to our foreign guests. Many of those guests have, in the past, extended to us a measure of hospitality in their own countries which we can never forget, and I can assure them that their presence here, affording us, as it does, opportunities of renewing friendships commenced under the happiest of circumstances, is especially agreeable to us.

Wherever, also, representatives of the British race are gathered together, it is always a source of pleasure to them to welcome their kinsmen from the other side of the Atlantic—an identical origin, a common language, and habits of thought in common, are great bonds of union, and the ever-increasing facility of ocean transport cannot but tend to knit more closely together the two great sections of the Anglo-Saxon race.

It is most gratifying to us to count among our guests the representatives of the various great Naval Powers, and we gratefully acknowledge the interest which those Powers have shown in our proceedings, an interest which proves how cosmopolitan is science, and which demonstrates that those who go down to the sea in ships and occupy their business in great waters are brothers all the world over.

We shall endeavour to make the sojourn of these gentlemen in our favoured land as pleasant as possible, and we are not without hope that we shall be able to bring under their notice some objects of interest, the inspection of which may perhaps repay them for the trouble and inconvenience to which they have been put in coming over to attend our Congress.

The Institution of Naval Architects, which was founded to promote and improve Marine Architecture and Marine Propulsion, has chosen the present auspicious moment to hold this International Congress, because, the history of these two arts, as we understand them from a modern and commercial point of view, is coincident with and contained within the limits of the long and prosperous reign of Her Majesty the Queen.

We, as a scientific body, are sensible in the highest degree of the privileges and advantages which Her Majesty's wise rule has conferred upon all the liberal arts and sciences, and we are

thankful for the freedom of thought, the absence of internal trouble, the long years of national peace which her good government has given us. If amidst the general rejoicings of the nation, if along with the acclamations which greet our revered Sovereign at this time, our voices should penetrate to Her Majesty's ears, we would ask Her Majesty to receive our humble congratulations upon the unique event which has just been celebrated, we would respectfully assure our Queen of the intense loyalty and devotion which those of us who are Her Majesty's subjects feel towards Her Throne and Person, and of the respect and admiration which those of our number who owe allegiance to other States entertain towards Her Majesty. It is our earnest and united prayer that Providence in His wisdom may spare her to her people for many years to come, and that no great private sorrow, no great anxiety of a public nature, may cloud the autumntide of her life.

I am anxious not to try your patience by overloading my address with figures and statistics, but I trust you will bear with me while I draw a brief comparison between the state of our Mercantile and Military Navies at the time of the Queen's accession and their condition at the present time, and also while I lightly touch upon the most noticeable inventions which have made this development possible.

In the year 1837 the United Kingdom and the Colonies possessed under 3,000,000 tons of shipping. In this year of grace the British Empire possesses nearly 15,000,000. In 1837 the imports and exports combined amounted to £97,000,000. They amount now to £730,000,000. In giving these figures I must remind you that other nations have also made great and rapid strides in the same direction during this period. The fact that our commerce has expanded to such a degree is a proof in itself that our neighbours have increased theirs to a proportionate extent and we heartily congratulate them upon this fact. The peace-making tendencies of mercantile development are without limit, and every nation benefits by the prosperity of the others. No old-world idea has been more thoroughly exploded than has the one that, when a nation is going ahead she is doing so at the expense of her neighbours.

It is a curious fact that almost all the improvements in shipbuilding and ship-propulsion which have enabled the Royal and Mercantile Navies to accomplish their respective tasks have been carried out during the reign of Her Majesty. For two centuries before 1837 the art and science of shipbuilding were in a state of stagnation. It is true that steam had been applied to ships, but the enormous expenditure of fuel which it entailed made it unsuitable except for the shortest voyages. Iron, too, had been used in the construction of a few barges and river vessels, but the art of combining the material into ships strong enough for ocean voyages was not generally known.

So recently as the year 1835 the late Dr. Lardner demonstrated in an apparently convincing manner the utter impossibility of carrying out steam communication between this country and New York, yet two years later saw the construction of the steamers, the *Sirius* and the *Great Western*, which showed the practicability of Atlantic steam navigation. It may be interesting for us to call to mind that the *Great Western* was a paddle-wheel steamer 212 ft. long, that she occupied 16 days on her passage to New York, while the *Lucania*, which at present holds the record with her passage of 5 days 7 hours 23 minutes, is a steel twin-screw vessel 601 ft. long.

It was in the year 1837, also, that the first iron vessel classed at Lloyd's was built. It is also a curious coincidence that during the first year of the Queen's reign two famous series of experiments with the screw propeller were carried out independently by Mr. Pettit Smith and Captain Ericsson, and resulted in the adoption of this mode of propulsion.

It is unnecessary to follow in detail the successive steps in the development of the screw propeller, but special mention must be made of its application by Mr. Brunel to the steamship *Great Britain*. This vessel contained the germs of many of the features which have since become permanent and was in many respects a most remarkable ship, embodying as she did in her construction many noticeable achievements of Naval Architecture and Marine Engineering. She was launched in the year 1843, and was by far the largest mercantile vessel that had ever been built. She was constructed of iron at a time when this metal was but little used for shipbuilding, and when the proper distribution of the material to obtain adequate strength of hull in large vessels was imperfectly understood. Her dimensions were:—Length, 322 ft.; breadth, 51 ft.; load draught, 16 ft.; and tonnage, 3,500. With nothing but the experience gained with the *Archimedes* (a small vessel) to guide him, Mr. Brunel took the momentous step of fitting the *Great Britain* with a screw propeller. After various modifications in her engines the *Great Britain* proved herself an absolute success, and made regular voyages between Liverpool and Melbourne right down to our own times.

No sketch of the history of modern shipbuilding would be complete without some reference to the *Great Eastern*, which was commenced in the year 1854, and launched in 1858. She was an iron ship, 680 ft. long, and with 83 feet of beam. Her displacement was 22,500 tons. This displacement has never yet been exceeded, though it must be mentioned that Messrs. Harland & Wolff are at present building a steamer, which, though of smaller tonnage than the *Great Eastern*, exceeds her in length by 25 feet.

The *Great Eastern*, though built 40 years ago, practically landed us in perfection as regards the construction of iron ships. Her longitudinal double bottom and the subdivision of her hull into watertight compartments are features which have found their way into the most modern practice.

Of all the improvements which have taken place in engines for marine purposes since Her Majesty ascended the throne, the most important and most epoch-making ones have been the adoption of the surface condenser and the introduction of the continuous expansion of steam in more than one cylinder. These two inventions have rendered possible the subsequent modifications which have so greatly conduced towards economy in fuel consumption; it is to them that we owe that cheap transport by sea which we now enjoy, a boon so necessary to a scattered Empire like ours, and so conducive to the due exchange of the world's commerce.

As Sir Albert Durston—and here let me pause for one moment to congratulate him upon the well-merited honour which Her Majesty has bestowed upon him—as he and Mr. Milton, two of the most representative engineering authorities in the country are about to read a paper dealing with these matters, it would hardly be proper for a layman like myself to refer to them in greater detail than I have already done.

Fascinating as is the study of the various improvements which have resulted in the increased development of steam pressures, in the ultimate adoption of water-tube boilers and in the successive steps by which the power of marine engines in proportion to their weight has been increased, I will leave to the two distinguished authors, whose names I have mentioned, the elaboration of this subject.

I cannot, however, resist referring to the latest departure in this long series of achievements, the successful introduction of the steam turbine for purposes of marine propulsion, which was so admirably described by Mr. Parsons in the paper which he presented to us at the spring meetings of the Society.

I have dealt with the growth and development of the Mercantile Navy first, because it is to their mercantile navies that nations must look for the expansion of their commerce and the increase of their prosperity. Whereas war navies, to which I will now refer, exist to protect that commerce and to safeguard the sea boards of the countries to which they belong.

At the time of the Queen's accession the British Navy was at a somewhat low ebb. You will appreciate this fact when I state that the Naval Estimates for 1836 only amounted to £2,750,000.

There were at that time some twenty-two paddle-wheel steamers in the Royal Navy, but they were of small dimensions; and, owing to the unsuitability of the paddle system for naval warfare, they were not regarded as a serious element in the floating defence of the country.

But in the year 1837—again this remarkable and never to be forgotten year—the successful application of the screw propeller in the *Archimedes* led to its adoption in Her Majesty's ships, and, in 1844, the first steam frigate, the *Arrogant*, was constructed. From that date up to the year 1859 there was rapidly developed that magnificent fleet of wooden line-of-battle ships and frigates propelled by steam, which culminated in the production of such vessels as the *Howe*, the *Duncan*, the *Mersey*, and the *Galatea*, vessels which for their stately beauty and symmetry of lines have never been surpassed in the history of shipbuilding. But the general adoption of the shell guns in the navies of all European Powers caused grave doubts to be entertained as to

their value as fighting ships, and men's minds were exercised to find a type of vessel constructed of a material more suited to the rapidly changing conditions of modern warfare.

So far back as the year 1845 orders were given for the construction of the iron screw frigates *Simoon*, *Megæra*, and *Vulcan*. Before these vessels were finished, experiments were made to test the effect of projectiles on their iron sides. The result of those experiments led the naval authorities to turn these ships over to trooping duties and to discontinue the use of this material for shipbuilding.

It was not till the year 1859 that the question of constructing sea-going iron ships with protective armour was seriously faced in this country. In that year, the two ships, *Warrior* and *Black Prince* were ordered, and they may be regarded as the forerunners of our iron-clad fleet.

From these two ships we can trace the evolution of the modern battleship through its various stages. The belt and battery system, which was brought to such perfection by Sir Edward Reed, was the first serious departure from the type of armoured frigate pure and simple. Then came the masted turret-ship, to one of which class, the *Captain*, so melancholy a recollection is attached. Sail power was for the first time entirely discarded in the breastwork turret-ships or improved monitors, *Devastation*, *Thunderer* and *Dreadnought*.

The substitution of mild steel in the place of iron for the hulls of ships, which commenced about 1875, was the next step of importance.

The introduction of the barbette and of the secondary battery, the rapid rise of the quick-firing gun, coupled with the invention of nickel steel and Harveyed armour, have combined to produce the battleship as we see her to-day, with her powerful and well-protected armament, her considerable speed, her great coal endurance, and her undoubted sea-keeping qualities.

Her Majesty, during her long reign, has thus seen her Navy thrice practically reconstructed. She saw her fleet of wooden sailing ships give place to one of wooden steamers. She saw that fleet disappear before a fleet of armoured ships, and now within the last ten years she has witnessed the rise of that magnificent modern Navy, which had its genesis in the programme of Lord George Hamilton, and which the wisdom of successive Boards of Admiralty, coupled with the genius of Sir William White, has added to the defensive force of the country.

It must be a source of the keenest satisfaction to our Queen to feel that, however much the possession of these superlative fleets has contributed towards the dignity of her Crown and the safety of her Empire, she has never (during the last forty years) been compelled to order the guns of her ships to be turned in anger upon any of the civilized nations of the world.

If I have appeared somewhat egotistical in thus dealing entirely with the progress made in our own Navies, my excuse must be that, at the present time the minds of all of us Britishers are liable to be bounded by the horizon of our Queen's Empire. I know that our friends from abroad will forgive us if this is so, and that they will be ready to make excuses for us in the special and auspicious circumstances in which we find ourselves placed. But we trust they will believe that, in our soberer moments we in this country claim no monopoly in the science and improvement of shipbuilding. We cannot forget that even in the days of sailing ships our good friends on the other side of the Channel could give us two stone and a beating in the designs and sailing capabilities of their men-of-war. We cannot forget that they ran us a dead heat in the production of a steam navy, that they were the pioneers of the building of iron-clad vessels, having been the first to equip floating batteries, and having launched and completed the first sea-going ironclad ever produced; we cannot forget that they set us the example in the manufacture and use of mild steel for shipbuilding, and, finally, we are constantly reminded that the new water-tube boiler, which we have come to regard as a necessary part of the equipment of our modern war fleet, bears a French name, and is the production of a French firm.

Our American cousins, too, have ever been famed for their inventive genius. They gave us a somewhat rough and practical lesson early in the century in the production and handling of powerful sailing frigates. The services of Fulton in the development of steam navigation can never be forgotten. Some of us remember, too, the magnificent sailing clippers produced in America, which at one time threatened to monopolise the ocean carrying trade of the world.

They possess, too, a wonderful ingenuity in adapting types to special circumstances. Their light-draught river steamers, those magnificent floating palaces which can almost traverse the dry land, provided the morning dew be heavy, and their whale-back boats used for the grain trade on the great lakes, are examples of that ingenuity.

The art of shipbuilding owes something to each of the great maritime Powers of the world. As a salient instance of this I may remind you of the heavy debt of gratitude which the whole shipbuilding profession owes to the metallurgical discoveries of Henry Bessemer and of the brothers Siemens. Other nations, too, have done valuable work by perfecting the details of inventions adopted from neighbouring countries, and by demonstrating in a practical manner the utility and desirability of many of the improvements, the use of which has now become general; and if I turn to the scientific work of the Institution of Naval Architects, I shall, I know, command universal support when I acknowledge how greatly we have been helped in doing that work by our neighbours and good friends on all sides.

It is not necessary for me to weary your Royal Highness by summarising the valuable work which this cosmopolitan Institution has done and is doing. Amongst our most active members we count men who represent the aristocracy of brains in that particular science with which we are associated, and your Royal Highness's kindness to us to-day is a proof in itself that you take us seriously.

We thank you again for your presence, and we would ask that, before leaving this hall your Royal Highness will be pleased, as our Hon. President, to sign and permit us to send a short telegram of congratulation to Her Majesty the Queen.

The meeting then divided into two bodies to hear the reading of and to discuss the following papers:—

"Hardened Armour Plates and broken Projectiles." By Monsieur Emile Bertin, Directeur des Constructions Navales, Ministry of Marine, Paris, Hon. Member I.N.A., which we have dealt with in our Editorial Notes.

"Non-flammable Wood." By C. Ellis, Esq., Managing Director Sir John Brown & Co., Limited, Associate I.N.A., which was as follows:—

An experiment which was recently made in London, with the consent of H.M. Office of Works, has drawn public attention to a novel method of rendering wood incapable of flaming or transmitting flame. Such a discovery cannot fail to be of interest to members of this Institution, and the Council have done me the honour of allowing me to bring the matter before you at this meeting.

As long ago as 1625 a patent was granted by the English Patent Office to one Beale for "a dressing for shippes and other vesselles as their mastes, deckes, tackles, sayles, and other furnitures, that they maie be preserved in fight at sea from burning or consumynge by wildefyer or gunpowder."

From that period forward countless efforts seem to have been made to obtain the desired result, but most of the experiments appear to have been conducted on the lines of soaking or coating timber with various preparations, and no plan seems to have been devised for securing what is absolutely essential, namely, that the fire-resisting treatment shall permeate the heart of the wood so as to render it internally as well as externally fire-proof.

The earlier inventors naturally lay under great disadvantages. Little was known of the chemical and physical qualities of wood, which, when they are thoroughly understood, appear to point to the practical solution which has been obtained under the discovery now under notice.

The various kinds of timber vary much in analysis, but (taking an average) wood may be said to contain about 40 per cent of water, 58 per cent. of combustible elements, and nearly 2 per cent. of incombustible elements, or ash, comprising various salts of lime, potash, and the like. In structure it consists of a number of cells or vessels, varying also with every kind of wood, in or around which the combustible materials above referred to are contained. This structure can be readily seen by an examination of the fine sections of wood which I am able to show to the Institution.

It is obvious that the main difficulty of getting rid of the combustible elements and substituting others lies in providing means for treating the cells without rupturing their delicate structure, and so deteriorating the value of the timber.

It is claimed for the new non flammable wood that this difficulty has been successfully overcome. By this process the timber is placed in a cylinder, and a vacuum is formed. Steam is then admitted, causing the moisture in the wood to vaporise,

the products of the vapour being drawn off. A vacuum is again formed, and the saturating liquid, containing certain salts, is forced in fine spray mixed with steam into the cylinder until the wood is thoroughly impregnated. The wood is then dried, and is ready for use. The salts which are thus forced into the wood by the process of saturation retard the rapid carbonisation of the wood under high heat, and particularly the generation of combustible gases, which are the cause of flame.

That wood so treated is incapable of supporting or conveying flame was conclusively proved at the experiment above alluded to. Two buildings were erected similar in design, one being built of ordinary and the other of treated wood. They were about 11 ft. square, with the floors about 4 ft. from the ground, the lower portions of the walls below the floor being formed of open trellis work, so as to allow for circulation of air and flame. The height of the buildings was about 30 ft. from the ground to the top of the wooden chimney. The framework and walls were constructed of pine internally fitted with linings of ash, oak, birch, and mahogany. Equal quantities of dry wood, saturated with petroleum, were piled to windward of each building, and simultaneously ignited. The untreated building was ablaze in a few minutes, and in half-an-hour was completely destroyed. The treated building, on the other hand, showed no signs of burning, except where the trellis work and walls were charred by actual contact with the flames from the burning firewood. On entering the building at this stage it was found to be quite cool inside, both on its walls and floor.

A further test was then made of the treated building by igniting a large heap of shavings and firewood inside the structure. By means of open doors and windows and the high open chimney shaft a strong draught was created. The flames from the burning wood rushed up through the chimney, melting the glass in the windows, the fire burning furiously for about twenty minutes. On entering the building it was found that it had been charred, as in the previous experiment, but that structurally it was quite uninjured. A box made of treated wood which had been inside the house during the fire was also found externally charred, but its contents remained in perfect condition. The success of the experiment above described was apparent to all who witnessed it.

Similar trials of which I have the particulars have been made in the United States; but, as the details do not differ from the London experiment, it is not necessary to further refer to them. A number of laboratory tests on a small scale have also been made; but, in view of the results given by the severe practical demonstrations above referred to, it is sufficient to say that they fully confirm the conclusion that the treated wood is absolutely incapable of transmitting flame; in all cases the results are identical, with the fiercest fire local carburisation only is caused.

Before dealing with the use of such wood in naval architecture it may be desirable to refer to a few of its characteristics. The treated wood weighs from 8 to 15 per cent. more than ordinary wood of the same kind, the increase of weight varying with the character of the wood employed. In some cases it takes a slightly deeper colour, but its general appearance is identical. There appears to be no considerable difference in working it, and, like ordinary wood, it is capable of receiving a high polish. So far as experience goes the treatment is of a permanent character. Pieces of wood have been tested after a lapse of two years since the treatment, and found to possess all the non-flammable qualities, and, in the opinion of eminent chemists, lapse of time cannot diminish the incombustibility of the wood, since stability and non-volatility are the characteristics of the chemicals employed.

It is also stated by experts that the process of saturation has a valuable preservative action, and that wood treated by the process will be largely protected from dry-rot, insects, &c. That this is at least probable is evident from the consideration pointed out by Laslett—that it is the combustible elements of timber which affect its durability, not only by their liability to oxidise in the open air, but by reason of their being the very elements which are consumed by various insects and fungi and other organisms which destroy the wood. A process therefore which consists in the treatment of timber in the manner described would appear *à priori* to be as efficacious in its preservative effect as in ensuring incombustibility.

From the foregoing remarks it would appear that, while on the one hand no practical objections arise to its use, the so-called non-flammable wood in no way belies its name, and in a most important particular is probably more suitable than ordinary timber. It is for the naval architect to decide whether and to what extent wood so treated should be utilised in shipbuilding. The arguments for its use rest on two grounds: (1) as being non-flammable, it is obviously so far at least superior to ordinary wood; (2) by reason of its low conductivity of heat it may be most usefully employed in substitution for material with greater conductive power.

With regard to (1), the risks of fires at sea are so terrible that little need be said on this part of the case. As to the danger of fire in naval warfare it is not necessary to go back further than the battle of Yalu. Mr. H. W. Wilson, in "Ironclads in Action," points out that the number of fires which occurred on board the ships of both combatants was a striking feature of that battle. The *Lai Yuen* was so severely burnt that nothing but her ironwork remained above the water-line. The *Ting Yuen* and the *Ching Yuen* were on fire three times, the *Chen Yuen* eight times, while four other vessels were on fire at least once. "The Japanese," says Mr. Wilson, "suffered somewhat from fire, though not so seriously as the Chinese. Doubtless their ships were in better order, and discipline on board them was more thoroughly maintained. It is also probable that less wood was used in the construction of their vessels. The fires seem to have been the effect of gunpowder alone." It may naturally be said that with better discipline such fires could not have assumed such serious proportions. No doubt this is so, but the main point remains that, if a fire breaks out in a naval engagement, men must be drawn from their ordinary duties, whether from the stokehold, or gun batteries, or elsewhere, to put the fires out, thus creating considerable disorganisation, and possibly panic. I am, of course, aware that, in the most modern vessels of war, the substitution of metals for wood has reduced the danger of fire, possibly to a minimum, but I shall await with interest the opinions of those best qualified to judge as to whether it would not be desirable to revert to some extent to the old material now that the danger of fire is practically over. The Navy Department of the United States has already specified that all wood used in the construction of vessels recently ordered (I believe about thirty in number) shall be treated by the new process, and the Japanese Government, who are always desirous of embodying in their designs any modern improvement, have also specified the treated wood for all timber used in the construction of the two new cruisers now building in American shipyards.

The second point above alluded to, namely, the low degree of conductivity of wood, points to its use in many cases where hitherto wood could not be used on account of the danger of fire. I may instance ammunition boxes, particularly where they contain smokeless powder, which, as is well known, is of so sensitive a character as to be materially affected by changes of temperature. It is also suggested that cylinders, and even boilers, might be cased with wood, and thus materially increase the efficiency of the steam service, and further conduce to the comfort and health of the men on board. In this connection it is of interest to note that, in experiments that have been recently made, it was shown that the conductivity of treated wood was about 50 per cent. less than that of ordinary wood of the same kind.

Great radiation of heat is necessarily consequent on the use of metals, and it is submitted that many uses may be found, whether on war, passenger or cargo steamers, for a material of less conductivity. In the case of ships passing through the tropics this point becomes one of the first importance.

In the above remarks I have only attempted to dwell on what appear to me to be the salient features of non-flammable wood, and look forward with much interest to hearing the opinions of professional members of the Institution who are far better qualified to judge of the value of the invention than myself.

"A Review of the History and Progress of Marine Engineering in the Royal Navy and Mercantile Marine from the Foundation of the Institution of Naval Architects to the present Date." By A. J. Durston, Esq., C.B., Engineer-in-Chief of the Navy, Vice-President I.N.A.; and J. T. Milton, Esq., Chief Engineer Surveyor Lloyd's Registry of Shipping, Member of Council, I.N.A. We have dealt with this paper in our Editorial Notes.

"Water-tube Boilers in high-speed Ocean Steamers." By Monsieur Pierre Sigaudy, Member I.N.A., which was as follows:—

Within the last two years, water-tube boilers of the small tube type have been used to such an extent and with such success that the time has come to examine whether they can be applied to ocean steamers, and whether the legitimate suspicion in which they were held by shipowners and marine engineers is still justified.

Looking back at the history of steam vessels, we notice—and this has been said before—that, during the last twenty years, real progress has been realised by the torpedo-boat constructors. They proved that high speeds, till that time considered as unattainable, were realisable, and they opened up the way for the latest improvements.

Referring to the boilers, with the locomotive type torpedo-boats reached 20 knots, or very little more, and Messrs. Thornycroft, Normand, and Yarrow, to name the most prominent constructors, will tell us the difficulties they experienced when they were obliged to increase the speed.

Too often leakages of tube-plates broke off the trials, and sometimes accidents occurred. From the day the tubulous boilers were adopted these accidents have nearly totally disappeared, and the speed has kept on increasing till it has reached, and even surpassed, the incredible 30 knots, and that, too, without any trouble with the boilers.

The same thing is certainly going on in large steamers. They attain 20 knots with great difficulties of construction, such as arge size, &c.; but if we want to go ahead seriously we must accept the tubulous boilers.

Certainly a great step has been made with water-tube boilers having large-size tubes, and remarkable results have been attained already; but these boilers would never bear the tests which torpedo-boats undergo. The tubulous boilers of these latter have supported a combustion of 80 lbs. per square foot of fire grate.

Of course, the idea is not to put on board of a large steamer a great number of torpedo-boilers, no more than Mr. Thornycroft put on board of his first high-speed craft a locomotive boiler without any modifications, but rather to adopt boilers constructed on the same principle as these and adapted to the wants of a long service and great endurance at sea on board a large vessel.

Thus the diameters of the boiler chests must be larger, the tubes that now have about 1 in. internal diameter in the torpedo-boiler will be increased to 1½ in., and perhaps a little more. The thickness also may be much greater. Finally, the whole must be combined to make the most of the available space and weight of a large vessel.

Accordingly I thought it might be of interest to lay before our Institution a scheme for the installation of tubulous boilers on a high-speed ocean steamer.

The scheme is intended for 23,000 H.P. in actual work; that is to say, from 26,000 H.P. to 28,000 H.P. on trials, and includes 16 double-ended boilers of the "Normand et Sigaudy" type, divided into two groups of the same size and having two stokeholds for each group. Fig. 1 is the longitudinal section of one group. Fig 2 is the plan; one side shows the stoking floor, the other side the platform of the fans. Fig. 3 is the transverse section.

The coal bunkers are situated on each side of the vessel, and the two groups of boilers can be separated by a compartment full of coal if convenient.

The dimensions and other particulars of the boilers are as follows:—

Pressure		220 lbs. per sq. in.
Number of boilers		16
Number of furnaces to each		2, divided by a fire bridge.
Number of groups		2
Grate surface for each boiler		95 sq. ft.
Total grate surface		1,520 sq. ft.
Rough heating surface for each boiler		4,650 sq. ft.
Total heating surface, about		74,400 sq. ft.
Tubes	Mean length	7 ft. 8 in.
	External diameter	1 7-16 in.
	Internal diameter	1 3-16 in.
	Number for each boiler	1,700
	Number total	27,200
Water	Volume for one boiler	326 cub. ft.
	Total volume	5,216 cub. ft.
Steam	Volume for one boiler	172 cub. ft.
	Total volume	2,750 cub. ft.
Number of funnels		2
Rough section of each		123 sq. ft.
Thickness of material	Upper chest	⅞ in & 1 11-16 in.
	Lower chests	11-16 in. and ½ in.
	Smoke boxes and funnels	3-16 in.
	Ash boxes, galvanised	3-16 in.
	Boiler casing galvanised	¼ in.
	Water tubes	⅛ in.

The weights of different parts are as follow:—

	For One Group of Eight Boilers.	For Sixteen Boilers.
	Tons.	Tons.
Boilers complete with mountings	295	590
Water in boilers	73	146
Funnels	50	100
Stokehole plates, floors, &c.	23	46
Feed pumps	7	14
Fans and fan engines	8	16
Feed regulators	1·5	3
Spare gear (50 tons) on board	10	20
Tools and fittings	1·5	3
Total	469	938

If the consumption of coal per I.H.P. of the engines is 1½ lb., which is generally obtained with tri-compound engines, the total combustion will be 23,000 H.P. × 1·50 lbs. = 34,500 lbs., or $\frac{34,500}{1,520}$ = 22·7 lbs. per square foot of grate surface, which is very small for a boiler of this type, which in destroyers supports a combustion of from three to four times as much.

The total weight of cylindrical boilers of ordinary shape, having 1,520 square feet of grate surface is, roughly, 1,700 tons. The saving of weight is 1,700 — 938 = 762 tons for the boilers only, but another reduction may be made also in the engines, when we consider that it is possible to reduce the diameter of the cylinders on account of the very high pressure of steam which it is proposed to use with the new boilers.

It is certain that with a cylindrical boiler a pressure of over 165 lbs. is obtained only with great difficulties in construction. Perhaps such a boiler is not even quite safe. With the small chests of tubulous boilers, the pressure can be increased to 300 lbs., as in the *Pelorus*.

This very high pressure gives the advantage of smaller cylinders, lighter moving weights, less distance between the axes of cylinders, and consequently less vibration.

I call your attention to this point: the comparison of weights between the two systems of boilers has been made, supposing the same combustion per square foot of grate to take place in each, but really the saving of weights could be much greater, since the only limitation to the intensity of combustion in these boilers is the durability of bricks and firebars; therefore for the same grate surface the tubulous boilers are much more powerful.

Mr. Normand has shown that, in vessels where the constant weight to be carried, as imposed by the conditions, such as cargo in high-speed ocean steamers, is small in relation to displacement, any saving in weight conduces to a reduction of displacement more than four times greater, the speed and time of steaming remaining the same. Accordingly a saving of 750 tons reduces the displacement by about 3,000 tons.

Since the dimensions of ocean steamers are limited by the depth of water in harbours, a great increase of speed can only be secured by reducing the weights. These considerations are sufficient to show the great advantages of tubulous boilers, without speaking of the security which results from their employment.

It has been objected that the scale could not be removed in curved tubes. It may be so with some boilers, but with the Normand type we have found that no difficulty whatever was experienced with a suitable chain and scraper. Even with straight tubes a chain is necessary, on account of the small diameter of the chests.

At the meeting in June, 1895, I had the honour to lay before you a paper on the coupling together of two boilers of different systems on the tug *Adour* of Bayonne, one being a return tube boiler, and the other a tubulous boiler of the Normand type.

Fig. 1.

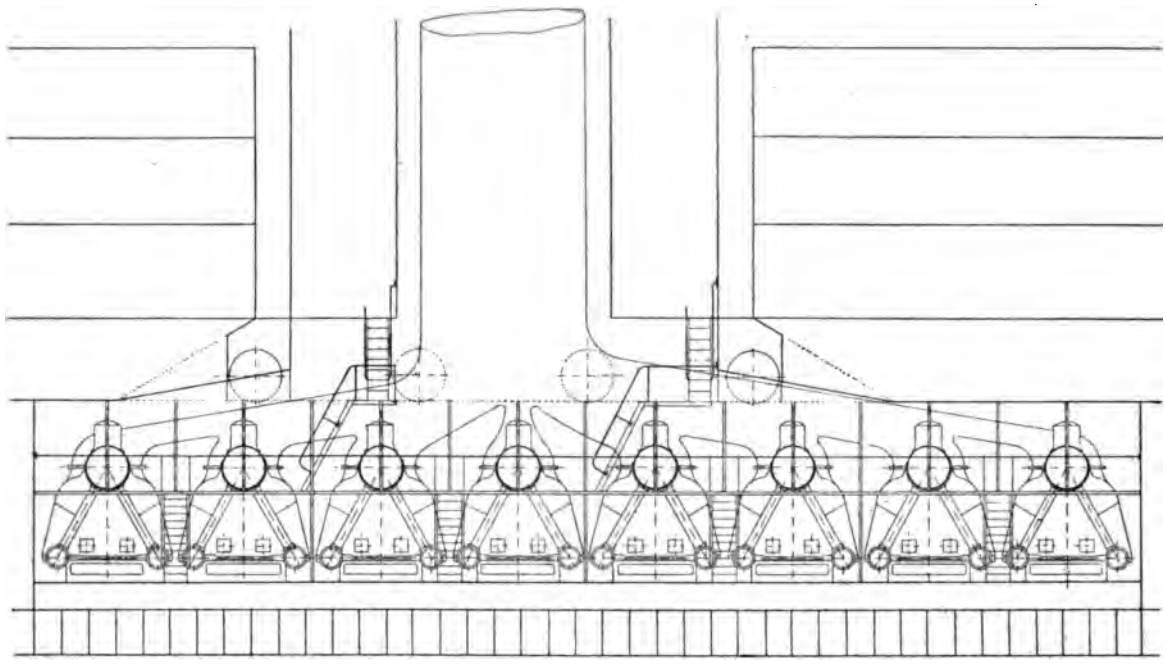
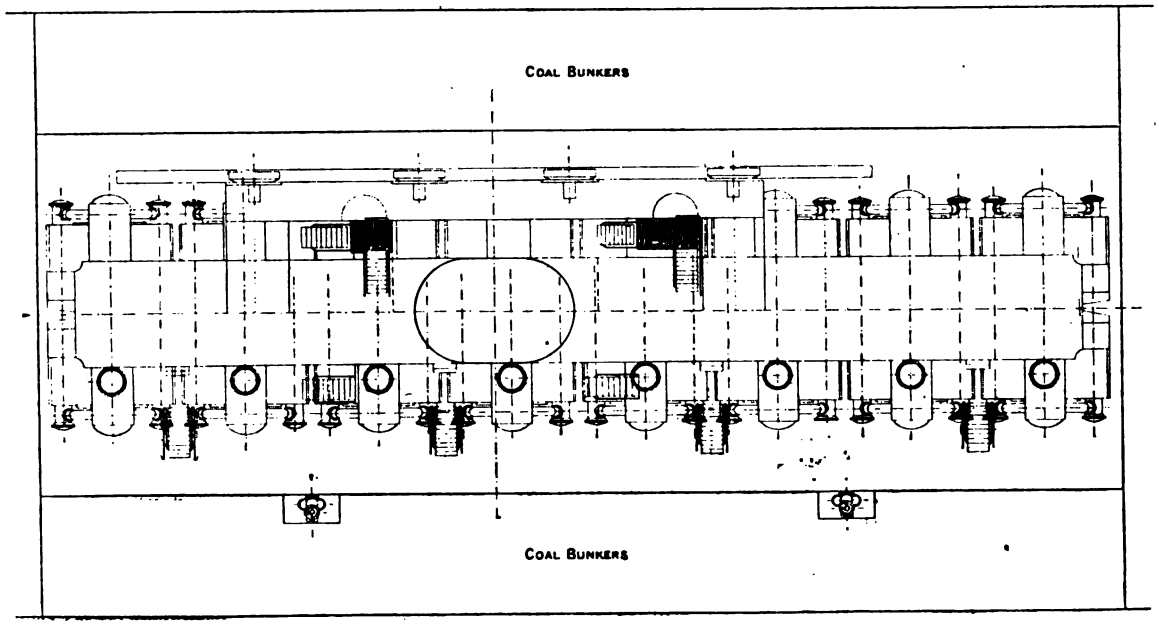


Fig. 2.



Water-Tube Boilers in High-Speed Ocean Steamers. (*See page* 165.)

Since this date the coupling together has given no difficulty, and, confirming my prognostications, the tubulous boiler has given better results than the return tube. From the engineer's log-book it appears that the water-tube boiler has been employed more frequently than the other on account of its ability to raise steam more quickly. It has never been stopped for repair, only some bricks of the fire-bridge having had to be replaced. The consumption of coal has been, roughly, 10 per cent. less in the Normand boiler than in the other.

The history of ocean steam navigation may be divided into several periods, each of which marks an advance on the preceding one. Up to this day, the greatest improvements have been :—

(1) The substitution of the screw for the paddle wheels.
(2) The adoption of compound engines.
(3) The triple and quadruple compounding.

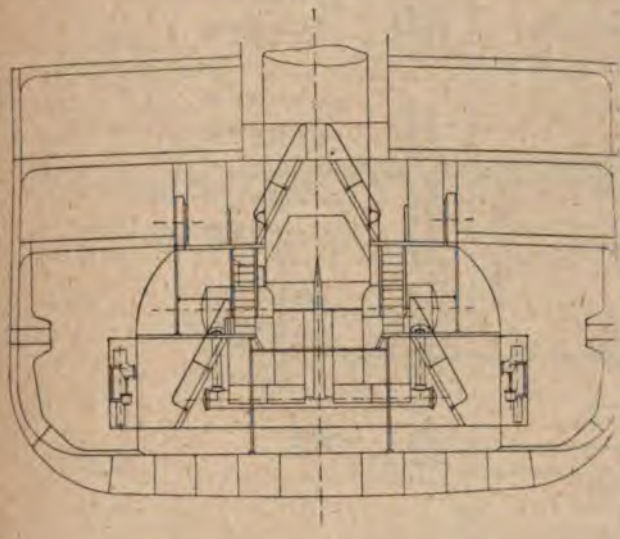
The next step will be the adoption of the water-tube boiler, and it will prove to be an advance of still greater importance than any of the former ones.

After the discussions on these papers had been concluded, a cold luncheon was served in the east garden and pavilion of the Imperial Institute.

In the evening the Lord Mayor and Lady Mayoress held a reception at the Mansion House.

On Wednesday, July 7th, the Congress again met at the Imperial Institute, when the following papers were read and discussed :—

Fig 3.



Scale 1/20

Transverse Section. (*See page* 165.)

"On the Advancement of the Mathematical Theory of Naval Architecture during the Existence of the Institution of Naval Architects." By Sir Edward Reed, K.C.B., F.R.S., Vice-President I.N.A. We have dealt with this paper in our Editorial Notes.

"Danish Steam Ferries and Ice Breaking Steamers." By Captain J. C. Tuxen, Director of Naval Construction and Engineering, Royal Danish Navy, Member I.N.A., which was as follows :—

Denmark, besides the Peninsula of Jutland, consists of a great number of islands, separated from one another by sounds or belts.

Most of these waters are shallow, at least near the harbours; only the larger of them may at times be rough. During the winter they are often filled with ice for one or more months; in some cases the ice covers the whole surface, but in other cases the ice is drifting.

Across these waters there is a considerable traffic, and great efforts have been made by the State and private firms to continue this traffic uninterruptedly during the whole year. The State railways have provided a floating *materiel*, consisting of steam railway ferries and ice-breaking steamers specially adapted for the purpose.

I venture to think that the special features of these vessels contain several points of sufficient interest to the members of this Institution to excuse my bringing the matter forward on this occasion.

I.—Steam Railway Ferries.

Formerly the traffic was carried across the water in ordinary paddle steamers, but the trouble of transhipment of the goods at each crossing led to the construction of steam ferries.

The first steam railway ferry was a paddle steamer, built in 1872 in Newcastle, capable of carrying five goods waggons on a single line of rails. The next ferry (similar to the first) was built in 1877. Four larger ferries were built in 1883, and the development has continued, so that the State railways now possess fifteen steam ferries, besides one building.

Table I. annexed gives the principal data of these ferries.

Ten of the ferries have a single line of rails, but the five largest have double lines. Twelve of the ferries have paddle-wheels, and only three have screw propellers. Two of the latter, fitted with twin screws, are running across a narrow channel, and can work better through ice than paddle-steamers could do. The single screw ferry is really an ice-breaking ferry, and will be described further on.

Detailed description of the ferries is unnecessary, as they are much like ordinary passenger steamers and ferries. Some special features of the class may be mentioned, and a short description of one of the largest ferries will suffice.

The first ferries were constructed to take goods waggons only, and thus to avoid the transhipments of goods. This principle has been followed throughout the development. Passenger carriages, as a rule, are not taken on board. In some cases a few through carriages are taken, the bulk of the passengers leaving their carriages at the ferries. Comfortable saloons for passenger accommodation are fitted underneath the deck in all the ferries, being well heated and ventilated, and in the later ferries lighted by electricity.

All the ferries have heavy timber fenders round the outside from end to end, at the height of the deck. The shape of this fender at the ship's ends is exactly the same for all the ferries, so that they may all fit in the different ferry harbours belonging to the seven crossings at which railway ferries are used.

The piers of the ferry harbours are constructed of timber and shaped to the form of the ferry; this goes end on into the berth and is stopped by buffers. A hinged bridge is lowered to the end of the ferry, which is arranged to receive the bridge, over which the waggons roll on board or ashore. As there are no great variations in the water-level, such as occur in tidal harbours, the difficulties are much reduced.

The lines of rails pass through the whole length of the deck of the ferries, and the waggons can be shipped or unshipped at either end, these being alike. The rails are placed directly on the plating of the deck and bolted to it. Underneath the deck-beams heavy longitudinal girders are built, one for each rail in the small ferries, and one for each line of rails in the large ferries, to take the weight of the railway waggons. The girders are again supported by a number of pillars.

The paddle ferries have a rudder at each end, and steam practically as well astern as ahead; they vibrate, however, rather more going astern.

The arrangements and installations are very similar in all the ferries, and a general idea of them may be had from the annexed drawing of the largest ferry, the *Kjöbenhvn*, built in 1895, which needs no further explanation.

The engines of this vessel are compound, with the cylinders placed diagonally. There are two high-pressure cylinders, 34 in. in diameter, and two low-pressure cylinders, 62 in. in diameter; the stroke is 54 in. There are four cylindrical boilers, with a steam pressure of 85 lbs. per square inch.

The ordinary full-power speed of this vessel at 9 ft. draug is 12·9 knots ahead or astern, with 1,400 I.H.P. On the measured mile the vessel has, at the same draught, made 14·4 knots, with 2,155 I.H.P.

II.—Ice-Breaking Steamers.

Formerly, when the sounds and belts were filled with ice, the traffic was carried across in open boats with huge bilge keels, on which the boats could slide on the ice. This was, however, a primitive way, and it was consequently found necessary to build ice-breaking steamers.

TABLE I.

Name.	Built.	Builder.	No. of Lines of Rails.	Paddle or Screw Steamer.	Length between Perpendiculars.	Breadth Moulded.	Depth Moulded.	Full Power Trial.			I.H.P.	Speed.	No. of Waggons to be Carried.	Cost of Building.
								Draught Forward	Draught Aft.	Displacement.				
					Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Tons.		Knots.		£
Lille Belt ..	1872	Wigham Richardson & Co., Newcastle ..	Single	Paddle	140 0	26 0	..	7 3	7 3	..	340	8 0	5	9,900
Fredericia ..	1877	Schichau, Elbing	,,	,,	140 0	26 0	..	7 3	7 3	..	360	8·0	5	9,400
Korsór ..	1883	Kockrun, Malmó	Double	,,	250 0	34 0	16 0	8 10	9 0	1,220	1,700	13 0	16	31,300
Nyborg ..	1883	,, ,, ...	,,	,,	250 0	34 0	16 0	8 10	9 0	1,220	1,700	13 0	16	31,300
Hjalmar ..	1883	Schichau, Elbing	Single	,,	166 0	26 0	12 0	7 0	7 0	440	600	10 0	6	12 600
Ingeborg ..	1883	,, ,, ...	,,	,,	166 0	26 0	12 0	7 0	7 0	440	600	10·0	6	12,600
Valdemar ..	1886	Burmeister & Wain, Copenhagen ..	,,	Twin screw	140 0	31 6	13 0	7 0	8 0	540	700	11·0	5	13,800
Sjalland ..	1887	,, ,, ,, ...	Double	Paddle	274 0	34 0	16 0	9 2	9 2	1,445	2,055	13·4	16	39,400
Dagmar ..	1889	,, ,, ,, .. .	Single	,,	166 0	26 0	12 6	7 9	7 9	495	470	10·2	6	14,700
Marie ..	1890	,, ,, ,, ...	,,	Twin screw	140 0	31 6	13 0	7 0	8 0	540	700	11 0	5	15,500
Kprs.-Louise	1891	Elsinore Shipbuilding Company ..	,,	Paddle	166 0	26 0	12 6	7 11	7 11	570	710	11 0	6	17,100
Alexandra ..	1892	Burmeister & Wain, Copenhagen ..	,,	,,	177 0	26 0	12 9	7 10	7 11	582	634	10·8	6	17,300
Thyra ..	1893	,, ,, ,, ...	,,	,,	177 0	26 0	12 9	7 10	7 11	582	600	10·2	6	16,600
Jylland ..	1894	,, ,, ,, ...	Double	Single screw	171 0	26 0	19 2	10 9	12 2	1,015	1,210	12·2	10	27,100
Kjóbenhavn ..	1895	,, ,, ,, ...	,,	Paddle	274 0	34 0	16 6	8 10	9 1	1,392	2,153	14·4	18	41,500

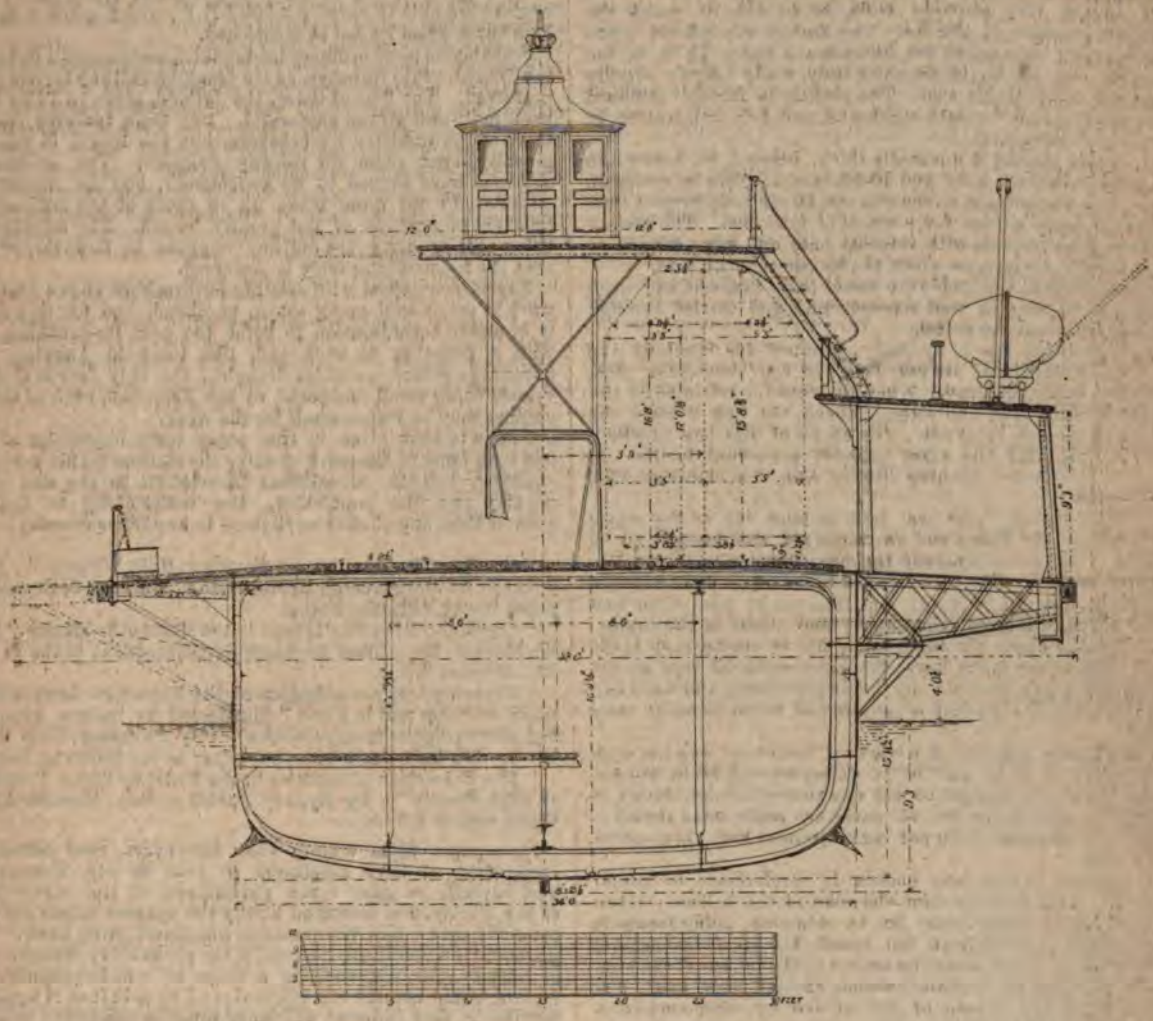
TABLE II.

Name.	Built.	Builder.	Single or Twin Screw.	Length between Perpendiculars.	Breadth at Water Line.	Depth Moulded.	Draugh Forward, Ordinary Trim.	Draught Aft, Ordinary Trim.	Displacement.	Draught Aft, with Tanks Aft Filled.	I.H.P. on 4 Hours' Full Power Trials.	Speed.	Cost of Building.
				Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Tons.	Ft. In.		Knots.	£
Staerkodder ..	1883	Burmeister & Wain, Copenhagen ..	Twin	150 0	27 6	14 0	—	10 6	625	11 2	800	—	24,500
Bryderen ..	1884	Kockrun, Malmó	Single	131 0	31 8	15 2	11 7	13 0	—	—	—	—	22,900
Mjölner ..	1890	Elsinore Shipbuilding Company ..	,,	135 0	32 8	15 7	10 9	12 9	728	16 0	1,350	12·2	23,200
Thor	1890	Motala & Lindholm, Sweden	,,	135 0	32 8	15 7	10 9	12 9	728	16 0	1,350	12·2	22,550
Tyr	1894	Elsinore Shipbuilding Company	,,	136 0	33 11	15 7	10 9	12 9	735	16 0	1,350	12·2	22,550
Slejpner ..	1896	Burmeister & Wain, Copenhagen ..	,,	161 5	39 0	18 6	12 9	17 9	1,450	22 3	2,600	12 75	33,300

Table II. gives particulars of the ice-breaking steamers now existing. The five first named are used for carrying the traffic across the sounds and belts when the steam ferries cannot work on account of ice. The *Bryderen* belongs to a private company, the four others belong to the State railways. The fifth, the *Sleipner*, is used for keeping open the free port of Copenhagen during ice winters and to assist merchant vessels in getting through the Sound to or from the free port.

tanks aft are not large enough to put the vessel well down by the stern. Consequently the propellers are much exposed, and the blades often break off. At first the propeller blades were of gun-metal, but now they are of cast steel, which stands better against the ice. The engine power also proved to be insufficient for the work, the total I.H.P. being only 800.

Experience gained with the *Staerkodder* was profited by in the construction of the next ice-breakers, and these have all proved



DIMENSIONS.

LENGTH OVER ALL	274 FEET 0 INS.
BREDTH MOULDED	34 - 0
DO AT PADDLE BOXES	58 - 0
DEPTH MOULDED	16 - 9½
DRAUGHT	9 - 6
DISPLACEMENT	1450 TONS
CYLINDER	2 A 34 INCHES
DO	2 A 62 -
LENGTH OF STROKE	54
WORKING PRESSURE	90 LB. PR □ IN.

DANISH FERRY STEAMER "KJOBENHVN."

The first ice-breaker, the *Staerkodder*, did not quite answer the purpose. The reason for this was that she was intended to be a good passenger and cargo steamer at the same time as an ice-breaker, and that she was given a very small draught on account of the shallowness of the water where she has to work. As seen from Table II., the length is large relatively to the breadth and draught, which has proved to be a drawback. Further, the vessel has twin-screws, and these are too close to the water-lines, as the

to be very successful, both for working through water filled with drifting ice and through a thick layer of ice covering the water. Comparing the *Staerkodder* with some of the latter ice-breakers (for instance, the *Mjölner* and *Thor*) it will be seen from Table II. what alterations have been made to secure better ice-breaking qualities. These vessels are made 15 ft. shorter, 5 ft. broader, and have 2 ft. 3 in. more draught. The draught can be much increased, as the water tanks aft are considerably larger and the longi-

tudinal stability smaller than the *Staerkodder*. The later vessels have a single screw propeller, and this can be brought well down underneath the water, and is thus better protected than the twin-screws of the *Staerkodder*. The engine power has been much increased, being 1,350 I.H.P. on the full-power trial of two hours' duration.

A short description of the largest and newest ice-breaker, the *Sleipner*, of which a drawing is annexed, will serve for all the class.

The principal dimensions of the *Sleipner* are given in Table II.

The hull is very strongly built, to be able to resist the enormous pressure of the ice. The frames are placed much closer together than usual, the frame-space being 15 in. in the fore body and 18 in. in the after body, while Lloyd's require 23 in. for a vessel of this size. The plating is further stiffened by six transverse watertight bulkheads, and five web-frames in engine and boiler-rooms.

The outside plating is unusually thick, being $\frac{7}{8}$ in. below the main deck in the fore body and 10-16ths to 11-16ths in. amidship and aft. This thickness is, on the average, 50 per cent. greater than required by Lloyd's rules for a vessel of that size. The plating is worked flush-jointed, with internal butt and edge straps, to form a smooth surface, on which the ice can take no hold.

The longitudinal ties inside the vessel (side keelsons and deck stringer plates) are also well strengthened, and carried through the whole length of the vessel.

The shape of the bow is specially designed for breaking the ice. The "water-lines" are very full, and the "bow-lines" fine, the forefoot being cut away. When the vessel is trimmed by the stern for ice-breaking, and steams ahead, the bow presses the ice downwards and breaks it. The shape of the bow is like a "spoon"; only that the stem projects somewhat further out than usual in steamers, forming an edge, which facilitates steering in open water.

Two water-ballast tanks are built in each end of the vessel for trimming. By filling the two tanks aft, the draught aft is increased 4 ft. 2 in., whereby the propeller comes well below the water surface. The two forward tanks when filled increase the draught forward 4 ft. 11 in. The tanks are filled and emptied through a large centrifugal pump placed in the engine-room. It takes about six minutes to fill or empty each tank. The air pipes of the tanks have the same sectional area as the water-supply pipes, to avoid any undue pressure on the walls and top of the tanks if the pump is not stopped in the moment they are filled.

The machinery consists of a vertical compound engine, with two cylinders of 40 in. and 70 in. diameter, and 36 in. stroke. To resist the strain brought on the machinery through shocks of the propeller against the ice, all parts are made extra strong—the shaft, for instance, is 20 per cent. stronger than required by Lloyd's rules.

A compound engine was chosen in preference to triple-expansion. This was done for the sake of the boilers. When the vessel has to break heavy ice by ramming, going forwards and backwards alternately at full speed, the steam pressure is very fluctuating, which would be trying to the boilers if the high pressure required by triple-expansion engines were used. On the other hand, the saving of fuel gained by triple-expansion would not be great for the kind of service required by this ice-breaker. To get a low consumption the boilers are designed with large heating surface to a steam pressure of 100 lbs. per square inch. For the same reason the engine is fitted with expansion slide.

The screw propeller is made very heavy, of cast steel, with loose blades that can be shifted while afloat. This is done by the following device, patented by Mr. Olsen, of Elsinore, and indicated in the drawings. A well is built in the vessel right above the propeller, the top and sides can be shut air-tight. Access to the well is through a hatch in the upper deck. Through a large hole in the bottom of the well works a vertical tube, which can slide down to the boss round a propeller blade. Air is pumped into the well, which forms thus a diving bell. Spare propeller blades are stowed in the well. When the tube is hauled up, the lower opening in the vessel for the well is closed by a steel plate.

When the vessel is working in ice it is difficult to get the necessary cooling water for the surface condenser. There are three sea valves for the entrance of this water; namely, two in the engine-room, placed somewhat apart and at different heights, and a third in the foremost ballast tank aft, which can be opened and shut from the engine-room. When there is much ice, the valves are apt to get choked. The cooling water is then taken from the ballast tank and returned to this again. Now and then the water in the tank is renewed from the sea. If necessary the vessel is stopped to free the sea valve of ice, as it is not so apt to choke then as when the vessel is moving. In this way it is possible to keep a good vacuum.

The vessel can carry 250 tons of coal. Loaded with 40 tons of coal and all four ballast tanks filled, the vessel easily maintains a speed of 12¾ knots, which requires 2,000 I.H.P. The engines are able to develop 2,600 I.H.P., which gives a speed of 13·4 knots when loaded as mentioned.

Probably no more ordinary ice-breaking steamers will be built for the Danish State railways, as ice-breaking railway ferries will be preferred. The first of these, the *Jylland*, given in Table I., has been built and proved successful. Her main features resemble those of the ordinary ice-breakers, but the length is relatively greater, to get room for railway waggons. The ice-breaking qualities have proved to be satisfactory, but the manœuvring qualities do not quite come up to those of the ordinary ice-breakers on account of the greater length. The advantage of being able to carry the railway waggons is, however, so great that the ice-breaking ferry is preferred.

Experience gained with existing ice-breakers shows that they work in ice as well going astern as ahead, and for this reason it is under consideration to build the next ice-breaking ferry with a propeller at each end, like those in America. The advantage gained is smaller draught; the only fear is that, the vessels being small compared to the American, each of the two engines may be rather small for the work.

I hope to have given in this paper some impression of what has been done in Denmark to carry the railway traffic across the sounds and belts. Considered in relation to the size of the country and the population, the undertaking is doubtless greater than any similar work done in any other country.

"On Graphic Aid in approximating Hull Weights." By I. Johnson (of Gothenberg), Member I.N.A. We have dealt with this paper in our Editorial Notes.

"Crank and other Shafts used in the Mercantile Marine." By G. W. Manuel, Esq., Chief Engineer Superintendent of the P. & O. Co., Member I.N.A.

"Experimental Investigation of the Nature of Surface Resistance on Ships and in Pipes" (illustrated by lantern apparatus and photographic transparencies). By Professor Hele Shaw, LL.D. We have dealt with this paper in our Editorial Notes.

"The Formation of Cavities in the Water by Screw Propellers, at High Speeds." By Sydney Barnaby, Esq., Member I.N.A., which was as follows:—

In a paper upon torpedo-boat destroyers, read before the Institution of Civil Engineers in 1895 by Mr. Thornycroft and myself, we gave some particulars of the screw trials of the *Daring*, and described briefly the reasons which led us to conclude that a new phenomenon was manifesting itself. This phenomenon seemingly pointed to the probability that the speed of vessels was approaching a stage at which propulsion by screws would become less efficient, and we said that it appeared inevitable that reduced efficiency must be submitted to as the speed of vessels increased.

If a cavity be formed in any manner in the interior of a mass of water it will tend to become filled with water vapour and with any air which might be in solution, since ebullition takes place at ordinary temperatures in a vacuum. We believed that at the speed at which the screws of the *Daring* began to give trouble such cavities were being formed, and were the source of the great waste of power and of other difficulties which were experienced.

This view met with not a little incredulity at the time, but I believe it to have been perfectly correct. The trials of the *Turbinia* and the experiments made by Mr. Charles Parsons, and described by him in this Institution in April last, afford very strong if not complete confirmation of our contention. Even without this confirmation, the fact that the steps were successful which we took to overcome the difficulty, when we had, as we believed, discovered the cause, afforded strong evidence of the correctness of the diagnosis. As the subject may not have been brought to the attention of many of our foreign friends, I thought a short explanation of the theory of cavitation might be of interest if made as lucidly as its nature will admit, and accompanied by a statement of the experience obtained with the *Daring*, upon which it is based.

Put shortly, the facts are these. With a pair of three-bladed screws 6·16 ft. (1m,88) diameter, 9 ft. (2m,75) mean pitch, and 8·92 sq. ft. (0m²,83) developed surface, the *Daring* attained a speed of 24 knots with 3,700 I.H.P., the screws making 30 per cent. slip. With a pair of screws of the same diameter, and practically the same mean pitch, but with a surface of 12·9 sq ft. (1m²,2)—an addition of 45 per cent. to the surface—the same speed was obtained with 650 less H.P., and with 17¾ per cent. slip instead of 30 per cent. The number of revolutions required for 24 knots with the screws of small area sufficed to drive the vessel at 28·4 knots when the blade area was increased. The vibration was unprecedented and dangerous with the narrow blades; it was of quite a normal and unimportant character when the blades were widened.

In order to arrive at a clear understanding of what is believed to take place, it is necessary to distinguish between the two cases—firstly, that of a propeller drawing air from the surface: and secondly, that of the formation of cavities when the propeller is submerged. The effect upon the thrust of a fast-running screw when the blades break the surface of the water or when air penetrates from the surface is well known. Under such conditions the velocity at which water can flow, due to gravity at a depth h below the surface, is equal to $\sqrt{2gh}$ and amounts, for example, to only 8½ knots at a depth of one metre.

If the velocity with which a portion of the blade situated at a depth h moves is less than $\sqrt{2gh}$ the water will keep in contract with it, even if the blade break the surface, and there will be no loss of efficiency. This is the case with the slow moving, partially submerged screws used by Mr. Barcroft to propel barges on the Irish canals, as described by him in a paper recently read at the Institution of Mechanical Engineers; and it also probably explains the good results obtained with the partially submerged screws of large blade area employed in some shallow-draught tugs on the Continent. The speed of the float of a paddle wheel is limited by the same condition. The particulars of a large paddle steamer, having feathering wheels 20 ft. 6 in. (6m,25) over the floats, which are 9 ft. 9 in. (2m,98) by 3 ft. 6 in. (1m,065), have been supplied to me. I find the slip—*i.e.*, velocity of float in relation to still water—is 11·2 ft. (3m,41) per second. In order that the water should attain this speed, it must have a fall of $h = \frac{v^2}{2g} = \frac{11{\cdot}2^2}{64{\cdot}4} = 1{\cdot}95$ ft. (0m,595), so that, if the top of the float was just awash when at rest, then, assuming that at the position of the wheel there was neither a wave crest nor a wave trough due to the motion of the vessel, the water would fall away from the float when in motion for a depth of nearly 2 ft., leaving 1½ ft. only immersed, as it would only be at this depth that the speed of the water due to gravity would equal that of the float.

I do not know whether designers of paddle wheels are in the habit of calculating in this way the probable immersion of the floats at full speed, but I think they might find it useful to do so.

When the screw is sufficiently submerged to exclude air from the surface the rate at which the water can be accelerated is very much greater. This can be illustrated as follows. Water will flow from a tank through an orifice discharging into the open air at a velocity depending upon the depth of the orifice below the surface of the water in the tank.

It will flow through the same orifice into the exhausted receiver of an air-pump at a much higher velocity, depending upon the degree of exhaustion in the receiver. The velocity in the latter case will be that due to the head of water plus the difference between the pressure of the atmosphere and that in the exhausted receiver. Similarly, the velocity with which water can be made to flow towards a submerged screw is due to the head of water over the screw *plus* the atmospheric pressure, and there is consequently a definite limit to the speed to which it can attain.

It was not easy to calculate theoretically at what point the breakdown would occur with a given propeller, but a way of attacking the problem suggested by Mr. Thornycroft proved to greatly simplify it, and to render its solution possible. His idea was that there must be a definite thrust per square inch of projected screw surface at which cavitation commenced.

A screw propels by putting water in motion sternwards. It effects its object partly by pushing the water with the after face of the blades, and partly by pulling it with the forward face. I will ask you to imagine that we have replaced the screw of a ship by a disc of rather less diameter than the screw, and that, instead of revolving the screw shaft, we push the shaft and disc sternwards at such a speed that the momentum of the water moved by the disc is equal to the sternward momentum of the water put in motion by the screw. The propelling effect would be the same as that of the screw,* and so far as the action between the forward face of the screw blades and the contiguous water is concerned, which is what I wish to illustrate, the action of the disc affords a sufficiently close analogy. As the disc moves sternwards, it puts water in motion not only astern of it, but also ahead of it. There being no air between the water and the front face of the disc, a pull can be exerted upon the water, which is forced to follow the disc in the same manner that water is forced to follow the plunger of a pump.

But the pull which can be thus exerted by the disc is limited. At a little depth beneath the surface of the water, if the tension exceeds 15 lbs. per square inch (one atmosphere), the surfaces of the disc and adjacent water are torn asunder, and a cavity is formed between them.

As but a little more than half of the total acceleration imparted to the water by a screw is estimated to be produced by the suction of the forward surface, it might be supposed that a total thrust approaching to 30 lbs. per square inch (two atmospheres) might be obtained, but it appears that rupture occurs at parts of the screw surface long before the mean thrust per square inch of the whole surface reaches this amount. This is probably accounted for by the fact that the thrust of portions of the screw blade near the circumference is much greater than at portions near the boss.

By plotting the results of a progressive trial carried beyond the speed at which cavitation commenced, we were able to note the point at which the first indications of failure appeared. It is not marked by a sudden change, but by a flexure in the curve of slip, which commences to rise rapidly when the critical speed is reached.

The total thrust of the screw at this speed divided by its projected blade area gave a thrust of 11¼ lbs. per square inch (0.75 atmosphere), which is, therefore, about the maximum thrust which can be obtained from a screw working efficiently at a depth below the surface of 11 in. (0m,28), which was the immersion of the tips of the blades in the *Daring*.† For every additional foot of immersion the total thrust per square inch may be increased by 3-8ths of a lb.

By means of the very ingenious expedient of trying a model screw in water heated nearly to boiling point, Mr. Parsons has been able to reproduce and examine the phenomenon of cavitation, and has corroborated our figure of 11¼ lbs. as the thrust at which it commences.

The difficulty of reproducing analogous conditions with a model lay in the high speed of revolution necessary: but by heating the water, and thus increasing the vapour pressure, lower speeds became possible. Since the tension of the water vapour at boiling point is equal to atmospheric pressure, a screw would cavitate in boiling water at the same speed as it would do if air were admitted to it. In other words, steam would be given off as soon as pressure was reduced. An analogous effect could be obtained by expanding by heat the residue of air in the exhausted receiver before referred to. Then the reduced difference of pressure between the air within and without the receiver would cause the water to flow into the latter from the tank more slowly, and, if the temperature of the air were raised sufficiently to cause a pressure inside equal to that of the atmosphere, the rate of flow would be that due to the head of water only. The same result would be secured by using a closed tank and exhausting the air in it so that the water would flow from one vacuous region to another, and, I believe, Mr. Parsons has suggested that further experiments might be made in cold water, the surface being relieved from the pressure of the atmosphere.

That cavitation will be the cause of trouble in the future is, I think, certain. Already it is becoming difficult to obtain the requisite area in screws of destroyers without either resorting

* This would not be true if the movement of the disc were continued far beyond the stern-post, but is nearly so if the movement is confined to the length of the screw.

† The figure should vary slightly with the pitch ratio, being less if the latter is high, since the ratio which the suction thrust bears to the whole thrust varies with pitch ratio, but the variation is so small as to be negligible.

to an abnormal width of blade or to a larger diameter and pitch ratio than would otherwise have been preferable. The one expedient gives undue surface friction, and the other necessitates a reduction in the rate of revolution, and therefore a heavier engine. The fact that the designer of the *Turbinia* has been forced, doubtless against his will, to employ nine screws in order to avoid cavitation is an evidence of its influence and a justification of the note of warning we raised in our paper of 1895 after the trials of the *Daring*.

In the evening the dinner of the Institution of Naval Architects was held, at the King's Hall, Holborn Restaurant, and afterwards a reception was held at the Admiralty by the Right Hon. George J. Goschen, M.P., First Lord of the Admiralty, and Mrs. Goschen.

On Thursday, July 8th, the members of the Congress embarked on two special steamers, which conveyed them to the St. Katherine's and the London Docks, which were inspected by the members, and after re-embarking they were taken to the Albert Docks, where luncheon was provided in one of the sheds, kindly lent by the Dock Company. After luncheon the members divided into parties, one of which visited the s.s. *Caledonia*, of the P. & O. Co., and the other visited the Thames Iron Works, where tea was provided.

In the evening a festival concert, followed by a supper, was held at the Queen's Hall, Langham Place, Regent Street. The orchestra at this concert was composed of 110 past and present members of the Royal College of Music. The chorus, to the number of 235, was selected exclusively from the famous Leeds Festival Chorus of 1895, which includes contingents from Leeds, Bradford, Huddersfield, Halifax, Dewsbury and Batley, were organised, with the express sanction of the Committee of the Leeds Musical Festival, by Fred. R. Spark, Esq., J.P., the hon. secretary to the Committee. The Leeds Festival Chorus has never before sung in London. Madame Albani and Mr. Andrew Black were the principal singers, while Dr. C. Villiers Stanford conducted. The programme was of an international character, pieces being selected from some of the leading composers of France, Germany, Italy, Russia and Great Britain. The details of the programme were settled by Dr. Hubert Parry, Principal of the Royal College of Music, and Dr. C. Villiers Stanford, Professor of Music at Cambridge University and Conductor of the Royal College of Music. This concert was a most successful event, and was much appreciated by all present.

On Friday, July 9th, the members were conveyed by special train from Waterloo to Portsmouth, at which place they were conducted over the Dockyard, where they were shown the work now in progress. They subsequently embarked on the s.s. *Mexican*, by the invitation of the directors of the Union Steamship Co., which then left Portsmouth and steamed down the Solent to within sight of the Needles, and then proceeded up Southampton Water. During the passage lunch was served on board ship. A short inspection of the Southampton Docks was then made, after which the members were conveyed back to town, reaching Waterloo about 6.30 p.m. In the evening the Hon. T. A. Brassey and Lady Idina Brassey held a reception at 24, Park Lane.

Her Gracious Majesty the Queen, with her usual consideration and tact, invited the members of the Congress to Windsor on Saturday, July 10th, whither they were conveyed by special train from Waterloo. A number of the distinguished visitors were presented to Her Majesty during this visit.

In the course of the afternoon the members were conveyed to Richmond by special train, and in the evening a dinner was held in the two large halls of the Star and Garter hotel. The band of the Royal Artillery played selections of music during the evening. As soon as darkness had set in, the hotel and its gardens were illuminated; the valley of the Thames was lit up with coloured fire, and a display of fireworks took place from the meadows in front of the hotel. The fireworks and illuminations were carried out by Messrs. C. T. Brock & Co., of the Crystal Palace, Sydenham. This item in the programme concluded the London portion of the programme.

Visit to the Clyde.

The representatives of the various countries taking part in the recent International Congress of Naval Architects and Marine Engineers in London journeyed to Glasgow on Monday, the 12th July, where they received a hearty welcome and hospitality becoming "the second city of the Empire," and the head-centre of marine engineering enterprise and progress. Not only did the two important shipbuilding firms, whose works they were specially invited to visit—Messrs. The Fairfield Shipbuilding Co., Govan, and William Denny & Bros., Dumbarton—make every provision for their edification and entertainment, but the Lord Provost of Glasgow and Councillors gave a reception in the magnificent Municipal Chambers, George Square, and on Wednesday a trip was made down the beautiful Firth of Clyde as far as Arran and Ailsa Craig. The visitors numbered about 180, 60 of whom were ladies, but on the visits to the works they were accompanied by local members of the Institution, and by representatives of the shipbuilding and engineering firms of the district; thus increasing the company to 350 or thereabout; while close on a thousand guests attended the reception.

Everywhere the visitors were received with the greatest cordiality, and the utmost freedom was permitted and help rendered in thoroughly inspecting the two immense establishments visited, where a large amount of important work was on hand for both the Naval and Mercantile Marine. In what follows, an effort will be made to convey some idea of the objects of greatest professional interest shown to the visitors, rather than to report the complimentary speeches which were everywhere made.

On Tuesday morning at 9.30 the visitors boarded the paddle-steamer *Meg Merrilees* at Bridge Wharf, and were conveyed slowly down the harbour; its shipping, cross ferries, docks, and cranes affording great interest to those on board. Arrived at Fairfield Dock, the party disembarked and were received by Sir William G. Pearce, Sir William Marriot, Sir William Arroll, Dr. Francis Elgar, directors of the Fairfield Co., and by Mr. Edmund Shearer, manager of the shipyard, Mr. R. Gracie, engineering manager, and Mr. Strachan, secretary of the company. Under the guidance of these gentlemen, and a corps of assistants, the large company were taken in detachments round the vast works, following a set itinerary with which each visitor was furnished.

Passing along the heads of the building berths these were at once seen to be well stocked with important work, both for naval and mercantile purposes. First in order came the first-class cruiser *Argonaut*, of 11,500 tons displacement and 18,000 I.H.P. This magnificent looking vessel was almost entirely sheathed with 4-in. teak, the holes for its fastening bolts having been drilled electrically by one of the "Rowan" machines, which was inspected with interest. For a considerable distance back from the stem, both plating and sheathing have had to be renewed, as a result of the destructive fire which broke out some time ago under the vessel's bows, caused through a hot rivet falling upon a pile of dry shavings and chips. But for this accident and its consequences the *Argonaut* would have been considerably nearer the launching stage at the time of the visit. Alongside the *Argonaut* were the two second-class cruisers *Hermes* and *Highflyer*, each of 5,600 tons and 10,000 I.H.P., both in frame to the protective deck. Beyond the cruisers rose the magnificent form of a large mail steamer, 7,250 tons and 9,000 I.H.P., for Sir Donald Currie & Co.'s Cape Line, and beyond it again the keel of a twin-screw steamer of 2,400 tons and 6,500 I.H.P. for the Roumanian States Railways, also the blocks for the keel of a magnificent twin-screw yacht of 2,250 tons and 3,500 I.H.P., which the company are to build, from Mr. G. L. Watson's designs, for Baron Edmond de Rothschild. Preparations are also being made for laying down a new mail steamer of 8,000 tons for the Orient Line.

The smithy with its long rows of fires, its steam hammers and interesting bolt-making machinery, was next entered, and from thence the visitors passed to the brass-foundry, where every kind of brass casting required by the company is made, up to 15 tons weight, there being seven pit fires and two reverbatory furnaces of 10 and 5 tons capacity. The large range of sheds fronting the slips which contains the varied and powerful machine-tools used in manipulating material, as well as the furnaces and blocks employed in preparing ship's frames, &c., were next gone through, and naturally absorbed a good deal of time and attention. Certain tools stood out from among the usual variety in respect of their massiveness and calibre, and these received special notice. Amongst these were a large hydraulic keel-plate bending machine, supplied by Messrs. Hugh Smith & Co., Glasgow, the weight of which without engine, pumps, &c., is about 150 tons; several large lever double-punching and shearing machines, capable of punching 1¼-in. holes through 1¼-in. steel plates, and having a gap of 42 in., so that plates up to 7 ft. broad can have every hole punched in them; several plate planing machines capable of operating upon

plates 36 ft. long; large plate rolling machines, small rolls or "mangles" for thin plating, &c., &c. During the time of inspection plates were put into the machines and operated upon. The frame-bending blocks and the furnaces for heating frames and plates were regarded with interest. The furnaces, which are of the type devised by Mr. Gorman, are fired by gas-producing furnaces with most satisfactory results.

Owing to the fire which took place about six months ago and destroyed the company's joiner shop, engine house, and a large portion of the platers' machine shed, and the tools underneath, re-construction has been going on at this part of the works for some time, and new tools are being laid down as well as very powerful driving engines. The latter were seen in course of erection in a substantial brick building, beyond which extends the new joiner shop of magnificent dimensions and splendidly lighted. On the ground floor the heavier wood-working tool, will be arranged, and the heavy deck houses and skylights built while the upper floor—through which a long and wide "well," or opening for light and air, is cut—will hold the lighter tools, workmen's benches, &c.

After visits had been paid to mechanics' shop, brass finishers' shop, and the pattern, polishing, and cabinetmakers' shops, presently in use, the large saw mills were inspected, and this brought the company alongside the large wet-dock and sheer-legs. Beneath the latter was the first-class cruiser *Diadem*, undergoing her machinery outfit. This vessel is of similar size and tonnage to the *Argonaut* on the stocks, but in the case of the latter vessel the H.P. has been increased to 18,000, as compared with 16,500 in the former. Near the dock were the batteries of Bellville water-tube boilers ready to be put on board, and needless to say these were inspected with the keenest, interest. At the stern of the cruiser lay the *Gipsy* and *Osprey*, two of the trio of 30-knot torpedo-boat destroyers recently turned out by the company, whose speed trials have been most satisfactory. Beyond the cruiser lay one of Sir Donald Currie & Co.'s Cape mail steamers, the *Dunnottar Castle*, which has for some time been undergoing thorough overhaul. Had the visit been made a week or so earlier, still another, and specially noteworthy example of Fairfield's productions would have been seen in dock. This was the *Empress Queen*, the magnificent Channel paddle-steamer built for the Isle of Man Steam Packet Co.'s service between Liverpool and Isle of Man. She was then taking coal on board down the Firth prior to starting for Liverpool, her speed trials having been gone through with most satisfactory results some days previously.

By way of solatium for the disappointment felt by many of the visitors in finding the *Empress Queen* not so graciously "at home" as they had found her illustrious namesake, we have pleasure in giving an illustration of the vessel from a photo taken while she was steaming at a high speed. She is one of the most powerful paddle-steamers afloat; her engines indicating 10,500 H.P., and during a six hours' run on the Firth she attained an average speed of a little over 22 knots. As no dock on the Clyde was found of sufficient width to take her in, her trials were run with the bottom in the condition due to her period of fitting-out in the thick waters of Glasgow Harbour. In the case of such high-speed vessels it is usually the custom to dock immediately before trial to have the hull cleaned and smoothly coated with composition. This has since been done at Birkenhead, and her performances since on actual service have been even better than what her trials on the Clyde gave promise of. The engines and all the machinery on board, as well as the vessel throughout, worthily maintain and even enhance the high reputation of Fairfield for vessels of this class. The crank is the largest ever fitted into any vessel. The design and structure of the paddle-wheels—which, as is well-known, form the weak point, as a rule, in high speed Channel steamers—embody features of extra strength, and reflect the highest credit on the Fairfield designing staff and constructors.

After viewing the vessels in dock, the visitors were conducted to the engineering and boiler-shops. In going through these splendid departments, with their wealth of working appliances, and the abundance of work in hand, many small detachments lingered where tools or work of special attraction presented themselves. Notebooks were in evidence, and there was every readiness, both on the part of the conductors and of the foremen in charge, to explain the working of the various machines. In the erecting shop the twin-screw engines of 18,000 I.H.P. for the *Argonaut* were seen well advanced, also the engines of 9,000 I.H.P. from the Castle Packet Co.'s South African liner.

Adjoining the erecting shop, and occupying two bays of the building, is the machining shop, where the enormous parts for marine engines are operated upon. Along with numerous other notable tools it contains a planing machine which admits of work 8 ft. square under the cross-slide, and takes a cut 20 ft. long; a large treble-geared face-lathe made in the works, which will turn 22 ft. in diameter. Next to this was seen a large machine, also made in the works, for surfacing heavy work and consisting of a large annular chuck 16½ ft. diameter, carrying sixty cutters near the outer edge; it is worked by spur gearing and the chuck can be traversed 21 ft. In this shop also are a large screw cutting lathe 41½ ft. long, a large slotting machine and a large shaft lathe. This shop contains six galleries in two tiers, where the smaller machine tools are placed, and on one of the top galleries brass finishing is done. Each of the bays is served by a travelling crane, two of which are rope driven and were made by Sir W. G. Armstrong & Co., the others were made in the works, and are driven by separate engines through steel wire rope.

The remaining bay, which is much loftier than the others, forms the boiler shop. It is served by an overhead crane of 100 tons, made by Messrs. Thomas Shanks & Co., Johnstone, which runs on longitudinal girders carried by wrought iron columns at a height of 44 ft. from the floor. The flanging, drilling, countersinking, and rivetting appliances here, of the heavies tcalibre and most modern make, were inspected with much interest. This included a Tweddell hydraulic flanger, capable of working a flange 5 ft. by 4 ft. on a plate 1½ in. thick; a horizontal flange-drilling and counter-sinking machine of Campbell & Hunter's make, which drills and counter-sinks the rivet holes of flanged plates at one setting, and can drill holes in furnace mouths from 2 ft. 9 in. upwards; a hydraulic rivetter of 140-ton power, for boiler shell rivetting, having a special 40-ton crane overhead by which the plates are suspended with the axis of the boiler vertical; vertical plate-bending rolls, by Messrs. T. Shanks & Co., Johnstone, capable of bending cold steel plates 1½ in. thick, and 12½ ft. wide. Not only were these cylindrical boilers being made, whose shell plates were 1½ in. thick, but in striking contrast were seen, finished and under construction, batteries of water-tube boilers of the Bellville type for the cruisers on hand by the company.

When the engine works, with their adjuncts, the smith's shop, tube-testing shed, &c., had been gone through, the visitors were conducted to the draughting and the commercial offices, and thence to the mould loft, where the whole company assembled and sat down to a sumptuous luncheon. Sir William Pearce presided, having on his immediate right M. E. Bertin, Paris, and on his left Rear-Admiral Bendemann, of the German Navy. The chairman proposed, in suitable terms, the toast of "Our Guests," and gave some interesting historical particulars as to the work turned out at Fairfield since the start. At the present time the company had in hand 56,320 tons and 116,500 I.H.P. Rear-Admiral Bendemann, Mr. W. M. McFarland, U.S. Navy, and M. Bertin severally replied in grateful terms, thanking the company for their kind reception of them and for all the interesting objects shown them. The last-named proposed the toast of "The Fairfield Co.," coupling with it the name of Dr. Francis Elgar, whom he flatteringly referred to as a naval constructor of great practical and scientific attainments.

Dr. Elgar, in responding on behalf of the Fairfield directors, said they were delighted to see their brother naval constructors and marine engineers. He had always been well received in visiting shipbuilding works in other countries. He hoped every guest had seen what was to be seen, and that if there were any secrets he hoped they had been found out, as he did not believe it was good for their profession that there should be secrets. If they had observed progress, he had to say it was due to the combination of science and practice. Thirty or forty years ago mathematicians were not shipbuilders, nor were shipbuilders mathematicians; and even now he would not advise a mathematician to become a shipbuilder. Modern progress in naval architecture and engineering resulted from the thought and labours of those who qualified for the practice as well as the theory of naval construction.

This concluded the proceedings at Fairfield, and the company then made their way to the *Meg Merrilees*, which was soon on her way down the river. Considerable interest was evinced in the vessels seen on the stocks of the several shipyards, especially those in the yard of Messrs. Simons & Co., at Renfrew, whose speciality in dredgers seemed to be well-known to very many of

PADDLE STEAMER 'EMPRESS QUEEN,' BUILT AND ENGINED BY THE FAIRFIELD SHIPBUILDING AND ENGINEERING CO., LIMITED, FOR THE ISLE OF MAN STEAM PACKET CO.

the foreign visitors. The celebrated Clydebank shipyard naturally received as much attention as possible in the passing. On the stocks there, the most noticeable objects were the first-class cruiser *Ariadne*, a large bow-screw steamer building for the Russian Volunteer Fleet, and several torpedo-boat destroyers.

Entering the river Leven, which joins the Clyde close to the base of the historic Castle Rock of Dumbarton, the *Meg Merrilees* soon landed the party at the crane-wharf of Leven Shipyard. They were welcomed by Mr. Peter Denny, Mr. Archibald Denny, Mr. Leslie Denny, and Mr. John Ward, all partners in the firm of William Denny & Brothers. Under the guidance of these gentlemen, and of Mr. George Brown, shipyard manager, and Mr. Gray, chief draughtsman, the company were conducted round the shipyard in sections; while one contingent visited the engine works of the firm, some distance up the Leven.

On the stocks here, a large amount of highly important work was seen in progress, all for the Mercantile Marine. This included three large steamers in various stages of progress for the British India Steam Navigation Co., for whom Messrs. Denny build extensively. These are of 8,000 tons, and are chiefly intended for cargo-carrying. Another and still more noteworthy steamer, almost ready for launching, was the twin-screw channel boat *Cambria*, building for the London and North Western Co.'s accelerated service between Holyhead and Greenore. This vessel is an advance, in the matter of size, power and speed, on the previous twin-screw vessels, the *Rostrevor* and *Connemarra*, produced by Messrs. Denny for this company within recent times. The speed on actual service is to be between 21 and 22 knots, and she will be launched on the 4th inst. Alongside this vessel was another but much smaller twin-screw steamer, building for the Union Steamship Co., of New Zealand, most of whose extensive fleet has been supplied by Messrs. Denny. In other parts of the yard the visitors inspected with interest a number of light draught vessels, to be shipped abroad in pieces and re-erected at their destination by native labour. Four of these were barges purely, but of immense length and breadth, and designed with a view to carrying locomotives, rails, bridge-work, &c. Two others were paddle steamers such as the firm produce in considerable numbers for Eastern river traffic.

In proceeding through the yard the visitors were impressed with its great area, and with the excellent provision made for transport of material throughout, and for the efficient hoisting facilities alongside the ship berths. The machine sheds, furnaces, smithy, galvanizing shop, hydraulic power station, and electric power station were all inspected with much interest. The machine tools here for steel working, although for most part of the usual kind and of a capacity to meet modern requirements, were supplemented by several hard tools which attracted special notice. This was so particularly in the case of a double-punch and shearing machine, driven electrically; a joggling machine, similarly operated, and of several tools which had been adapted for plate-flanging work.

The joggling machine is that introduced by Messrs. Doxford & Son, of Sunderland, for joggling the edges of shell and deck plating, and dispensing with frame and other fillings entailed in the ordinary system of "raised-and-sunken" or out-and-in plating. Messrs. Denny have already turned out one steamer on this principle, and they are likely to continue adopting it, in the case of cargo vessels especially. It is being followed in the case of the large British India steamers already referred to, and it is computed that on each of these vessels the saving in structural weight will amount to about 60 tons. The only other firms on the Clyde who, so far as we are aware, have adopted the joggling system is that of Fairfield. They have also acquired a Doxford joggling machine, although for some time this may not be employed on shell plating, but confined to deck and tank top plating; the joggling of which, by means of the ordinary bevelling machines, has been carried out by this firm—and possibly by others—for some time. It may be stated that Messrs. Russell & Co., of Port-Glasgow, dispense with the need for fillings, &c., by joggling the frames of vessels instead of the plating.

The Leven Shipyard, it is well known, has long been renowned for the high class character of the joiner and cabinet-making work put into the vessels produced there, and it was therefore of great interest to be taken through the departments where such is produced. In the joiner's shop many tools were seen which had been improved by the workmen operating them, as a result of the scheme of awards for inventions which has been established by the firm for many years. Special interest was taken in panel surface planers and sand papering machines, the smoothness of the surface left by these tools being subject of great admiration. The visitors were specially shown a clever morticing machine, of American make, in which the distinguishing feature is a revolving chain band cutter which does its work most expeditiously, and clears away the dust and chips while working.

The most novel sections in Messrs. Denny's yard, and to many of the visitors the most interesting, was the experimental tank, which has often been referred to in our columns. It was established by the late Mr. William Denny, after the pattern of the tank originated and long conducted by the late Dr. William Froude, at Torquay—whose son, Mr. R. E. Froude, still presides over a similar tank at Gosport for our Admiralty—chiefly for the testing of the speed and resistance of ship models. Mr. Archibald Denny read a very interesting and exhaustive paper on his firm's tanks before the marine section of the Civil Engineers' Institute some months ago. This gentleman, and Mr. Edwin Mumford, the manager of the tank, were most courteous in showing the visitors all the outstanding features of the system employed. The whole process, including the moulding of the wax model to be tried; the cutting and smoothing of the model to the required shape by the special shaping machine designed by Dr. Froude; the placing of the model in the tank and the manner of its attachment to the carriage which runs on rails above the surface of the water, carrying the model freely with it; the intricate mechanism on the carriage by which record is graphically taken of the speed and distance, the resistance, change of trim, &c., all was clearly explained. Many of the foreign representatives signed their names in the visitors book kept in this unique department of the works.

The whole company were afterwards entertained in the Model Hall in the firm's general offices. Mr. Peter Denny expressed on behalf of his firm the pleasure it gave them to receive so distinguished a company and to show them their works. The sooner they came back again the better the firm would be pleased. Mr. Denny's speech was repeated in French by Mr. A. Denny and in German by Mr. Leslie Denny. Herr C. F. Laeisz, of Hamburg, replied, thanking the Messrs. Denny, and said that in coming to the Clyde they had felt they were coming to the cradle of the art of shipbuilding, and that here, if anywhere, were the founders and masters in naval architecture and marine engineering. He said that notwithstanding new discoveries and departures their Scotch brethren were still first in the race, although, added the speaker naively, they would surely have no objections to other nations trying to keep pace with them. Herr Laeisz concluded by proposing the health and prosperity of Messrs. Denny & Brothers, and Mr. John Ward fittingly responded. The visitors left Dumbarton for the city again about 5 o'clock, per the Caledonian Railway, and in the evening about eight o'clock attended the Reception given by the Lord Provost in the Municipal Chambers. The guests present numbered close on 900, including a large number of ladies, and the magnificent character of the interiors of the chambers surprised and delighted the visitors. The whole of Wednesday was devoted to a trip on the Firth of Clyde on board the paddle steamer *Duchess of Hamilton*, one of the most magnificent of the Clyde river steamers, and was greatly enjoyed, the weather being charming. The whole of the arrangements made for the entertainment of the visitors were carried out admirably, and collectively and individually the gratitude of the party was expressed to the firms who had made such provision for their edification and pleasure and to the Provost and Councillors of Glasgow for their magnificent reception. At 7.30 on Thursday morning the visitors left Glasgow per North British Railway for Newcastle-on-Tyne, where they arrived about eleven, and after inspecting the vast works of Sir W. G. Armstrong, Whitworth, & Co., Limited, at Elswick, left about four o'clock for London, where they arrived about 10.45; thus putting a period to the round of sight-seeing, which will be long remembered as having formed no inconsiderable part of the "Congress" of 1897.

An interesting visit was paid to the Elswick Works of Sir W. G. Armstrong, Whitworth, & Co., Limited, Newcastle, on July 15th, by about two hundred members, who stayed about four hours on the way from Glasgow to London. They were received on the platform of Elswick Station by Colonel Philip Watts, who straightway led the company into the westernmost gate of the works, about a hundred yards from the station.

The inspection was commenced without formal ceremony of any kind, the engine works being the first to be visited. The principal products in various stages of manufacture to be seen here are steam pumping engines, swing bridges, coal hoists, and hydraulic machinery generally. The company passed thence to the ordnance works, where operations on heavy guns in process of manufacture were witnessed, including the boring, turning, rifling, and the cutting of breech screws in the huge pieces of armament. Similar operations for 6-in. and smaller guns, including a pit to bore gun barrels vertically, were seen in other shops belonging to the ordnance department, and after seeing the Hotchkiss guns, mountings, and ammunition, the party were conducted from the works to the Elswick Mechanics' Institute for luncheon, after which the guests were conducted back to the works, where they first inspected four more shops in the ordnance department, where they saw in process of manufacture small mountings and torpedo tubes, dismounting gear, turning and finishing 6 in. guns and breech fittings, 8-in. mountings and shields, and power and shell hoists.

Elswick shipyard, reached through the new smiths' shops, was the next department visited, and proved of exceptional interest to the company. The firm have now under construction the following vessels of war:—

	Tons.	Speed in knots.
One armour-clad battleship	14,800	18
One armour-clad battleship	12,200	18
Two first-class armoured cruisers, each of	9,600	20
One first-class armoured cruiser	8,500	20
Two fast protected cruisers	4,500	24
Two fast protected cruisers	4,300	23½
One fast protected cruiser	4,250	21
Two armour-clads	3,800	17
Three fast protected cruisers, each of	3,450	20
One third-class cruiser	2,800	18
One training ship	2,500	14
One torpedo-boat destroyer	300	30

(Besides mercantile vessels at their shipyard at Walker).

From the shipyard the party proceeded by train to the steel-works, where they saw Siemens' melting furnaces, capable of casting 500 to 600 tons of steel per week. Four hydraulic forging presses were shown at work, and a steel ingot cast—an operation which always excites considerable interest. Finished guns of all sizes up to 8 in., aiming tubes, gun carriages, band saws cutting armour plates and other heavy material, and electrical machinery for search-lights and like appliances were next seen, and the visit concluded with an inspection of the manufacture of projectiles of all kinds and sizes, of cartridge cases for guns up to, and including 6 in., the casting of projectiles—common shell, chilled shell, &c.—and castings for steam and hydraulic machinery.

The visitors were greatly interested in every department of the works, and expressed their admiration at the methodical completeness and excellence of the arrangements made for their inspection. The vastness of the whole establishment was a matter of general comment amongst them, and no wonder need be expressed at this when it is stated that there are at present in course of manufacture at Elswick 900 guns of various calibres up to 12 in., and the number of men employed by the firm is about 24,000, exclusive of any working in mines or collieries.

In conclusion we would say that it will be conceded by all who were present that the Congress was an unqualified success, which was brought about very largely by the immense amount of personal work and energy undertaken and executed by the President, the Earl of Hopetoun, assisted by the Executive Committee and Mr. George Holmes and his able assistants. We congratulate the Institute of Naval Architects most heartily on the success of the undertaking and also upon having such a pqactical President and efficient body of officers.

Marine Engineers' Examination.—At the Board of Trade Examination held on July 13th, 14th, and 15th, Mr. W. Harrison, of Darlington, and Mr. W. James, of Liverpool, passed for Extra First Class Engineers, the former succeeding the first time of going up. They were prepared by Mr. Thorn, 5, Waterville Terrace, North Shields, and make 41 successes in the above grade from this establishment.

KIRKALDY'S PATENT REVOLVING DOUBLE DOOR FOR WATERTIGHT BULKHEADS.

HEREWITH we have pleasure in illustrating Kirkaldy's patent revolving door for bulkheads, an example of which has recently been on exhibition in the show-rooms of Messrs. Tangye's, Glasgow, and for which a decided "future" may be predicted in connection with naval and merchant ships. As will be readily gathered from our illustrations, the arrangement consists of a hollow cylindrical casing, bolted to the watertight bulkhead, in whose circumference are

FIG. 1.—INGRESS DOOR CLOSED, EGRESS DOOR OPEN, REVOLVING DOOR BEING OPERATED FROM OUTSIDE.

two open doorways, one on the fore side and the other on the aft side, as a means of ingress and egress. Within this casing, and close fitting, is a revolving hollow cylinder, having one doorway in its circumference, of dimensions corresponding to each of those in the outer casing. This inside cylinder is suspended by a central bolt above, and revolves easily on ball bearings. When it is intended to pass through the bulkhead from one compartment to another the aperture in the revolving cylinder is brought round—in the manner illustrated by Fig. 1—to correspond with the doorway in the casing at the ingress side.

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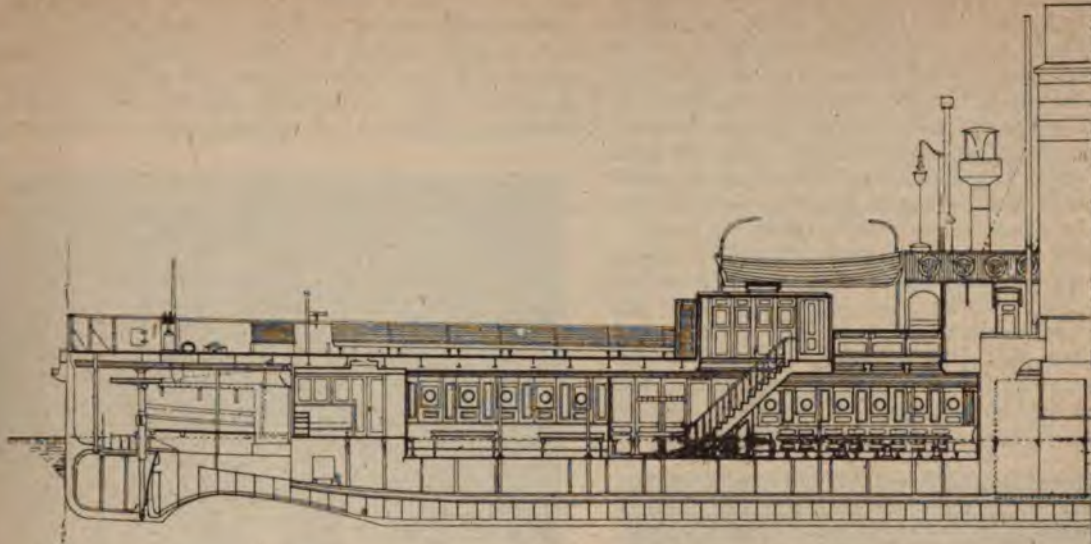

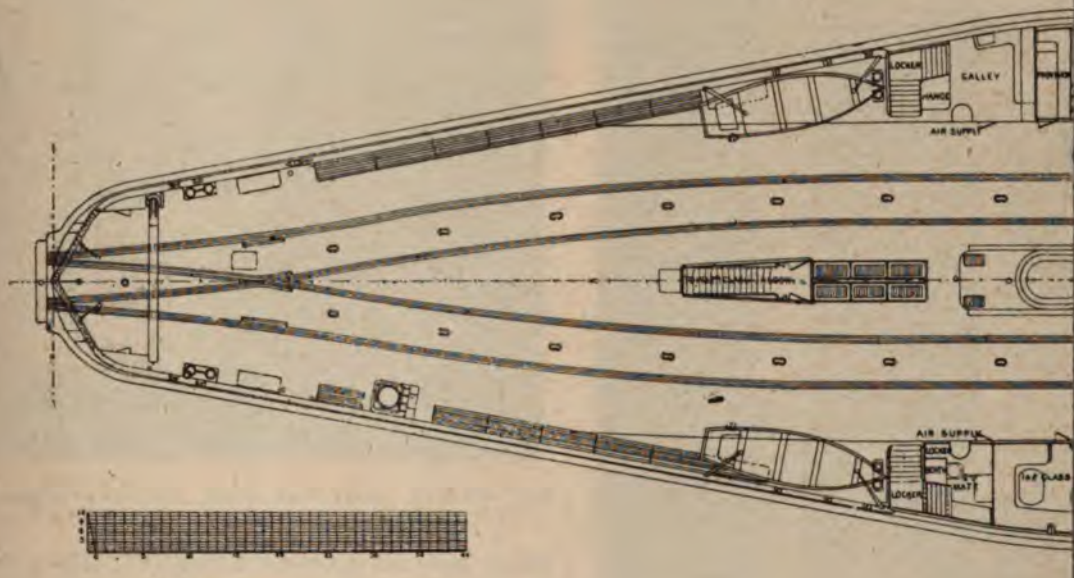

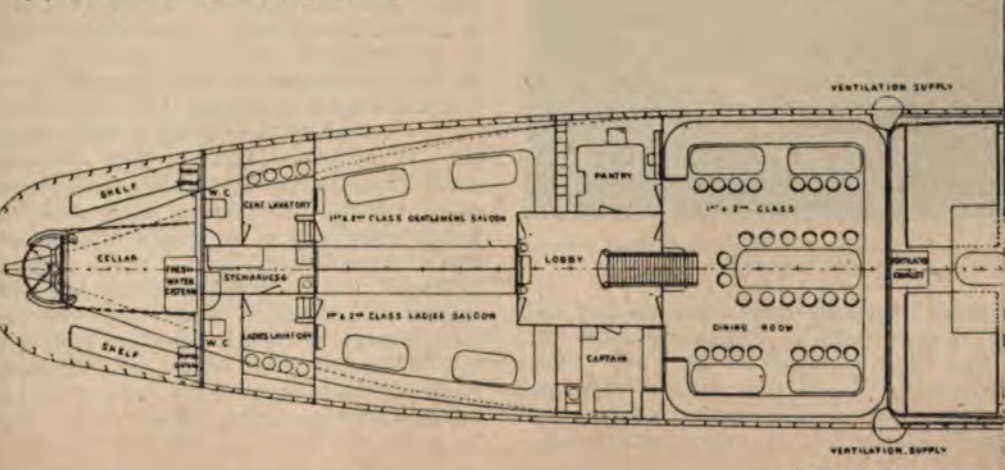

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done—and it takes less time to do than in the g—the ingress door is open and the egress door sed. Stepping inside the hollow cylinder, the n operating can easily revolve it by the means ded. The ingress doorway is thus absolutely d before the opening in revolving cylinder

INGRESS DOOR OPEN, EGRESS DOOR CLOSED. REVOLVING DOOR OF BEING OPERATED FROM EITHER SIDE OF WATERTIGHT BULKHEAD.

des with the opposite doorway, affording egress ne other compartment. The several stages in peration of passing from one compartment to er are well illustrated by our engravings, but, as indicated, the whole operation is accomplished norter time than is taken to describe it.

distinctive and invaluable feature of this ing double-door is that it is impossible to leave n at any time when passing through the bulk- because one doorway must be absolutely closed the other opens. This condition of things ies with the recommendation of the Board of 's Bulkhead Committee of 1890, that the intact- f a watertight bulkhead should be insured and thoroughly reliable in the event of any disaster ing an inflow of the sea to any compartment of . In this case, should any compartment be d the pressure of water has only the effect of jamming the revolving cylinder still more tightly against the outer casing and enhancing the security of the adjoining compartment from flooding. These and other features which the Kirkaldy door possesses of providing against every contingency in the event of disaster, ought, we think, to have due appreciation from naval architects and shipbuilders, and from all those on whom the responsibility of safety on ships at sea devolves—owners, captains, and officers.

Apart altogether from the exceptional features of safety which the door possesses, it will be readily gathered that no gear whatever is required to close the door from deck, as it is *absolutely impossible to leave it open.* The door also forms a ready-made and efficient air-lock whenever the stokehold is under forced draught. Thus a substantial saving will be effected in weight and cost, especially in warships, through the absence of gear for operating doors from

FIG. 3.—INGRESS DOOR OPEN, EGRESS DOORS CLOSED, REVOLVING DOOR BEING OPERATED FROM INSIDE.

deck and air-locks from stokehold passages. Moreover when a warship collides, strands, or goes into action, or when high-speed mail and passenger steamers have to push ahead, although icebergs be near, or fogs envelope them, a sense of security and confidence will pervade the minds of all on board

vessels which may be fitted with doors of this kind. The doors under the water level are effectively closed, and require no attention in the event of the hull being peforated and the sea finding its way into any of the compartments. Then, the men engaged in the engine and boiler rooms—for it is in this region of the ship where openings in bulkheads are all but indispensable, and where this patent door is more particularly invaluable, have the satisfaction of knowing that when all communication with decks is cut off in any given compartment they have the doors under their own control, and the means of escaping from said compartment to another, or from danger to safety.

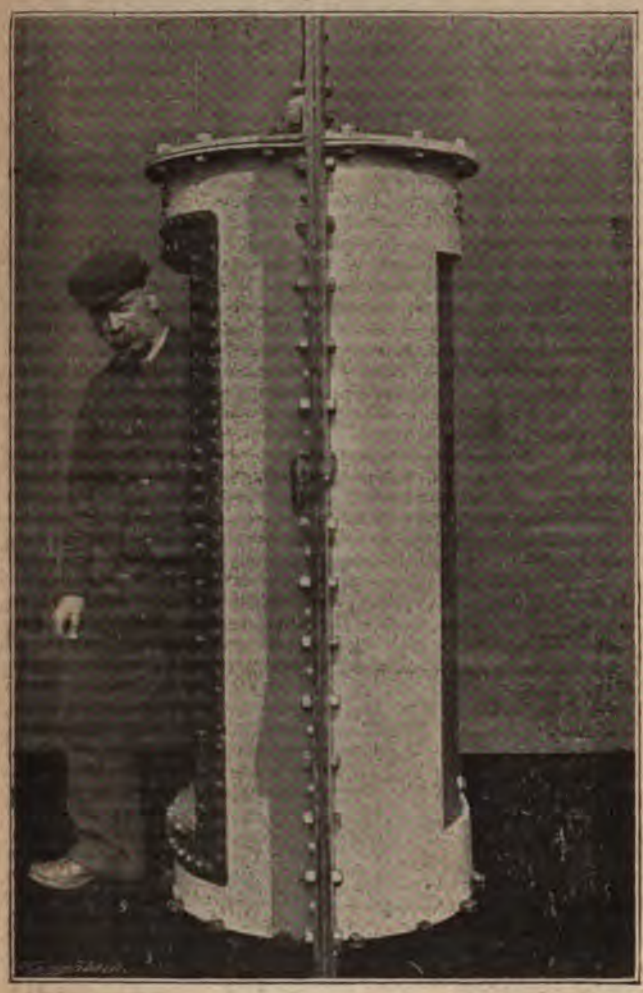

FIG. 4.—INGRESS DOOR CLOSED BEHIND AND EGRESS DOOR OPEN IN FRONT ALLOWING EXIT FROM CASING.

The door has many other advantages which can only be briefly alluded to. The outside casing being in the cylindrical form and strongly made and bolted to the bulkhead plating, acts as a stiffener to the bulkhead, and neither outer casing nor revolving door will be affected by any ordinary twisting or buckling which may be sustained by the bulkhead plating. The weight of an ordinary sized door, complete, does not exceed 16 cwt., and, with improvements in the manufacture, may be made even less. As the door does not lift vertically, or slide horizontally, room is saved on the bulkhead which may be utilised for auxiliary machinery, and the absence of opening and closing gear simplifies the arrangement of platforms, pipes, &c. The door has been approved by the Board of Trade, and has received the enconiums of hosts of the shipping and shipbuilding authorities who have inspected it during its exhibition in Messrs. Tangye's warehouse in Hope Street, Glasgow.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Daily Press and the "Aden."

THIS sad accident is referred to elsewhere in these Notes. But it would be strange indeed if anything to do with our first line of defence, or with the merchant ships which are so indispensable to our country could be referred to without egregious mistakes on the part of the non-technical press. On this occasion nearly all the papers got into bad trouble over the difference between "indicated" and "nominal" H.P. The majority of them stated that the unfortunate *Aden* had "engines indicating 500 H.P." This is of course absurd. That was her nominal H.P. Her indicated was nearer 3,000. Then, again, a paper which justly prides itself on its interest and accuracy in things naval spoke of the *Aden* as "having seven bulkheads dividing her hull into nine compartments." How this could be done would be a puzzle indeed for the naval architect. Vessels may have, and do have, one more compartment than they have bulkheads, and for that reason the smart person who is boasting of the appliances for safety with which his ship is furnished is wont to speak rather of the number of her compartments than of the number of her bulkheads, because by doing so he scores one. But it can hardly be that any juggling with figures will ever enable a second point to be scored in this way.

Publications.

From Messrs. C. W. Kellock & Co. I have received the usual monthly lists of vessels of all sorts, sizes, and rigs, which they have to dispose of. The lists of those which are merely referred to by folio numbers seem as extensive as ever. But the front page this month is a very good index of the large—one might almost say the exclusive connection—which Messrs. Kellock have with the great steamship lines. Elsewhere I refer to the big deal they have had with the new Allan Company, Limited, during the last few weeks. At the moment they have on offer another old Pacific Steam Navigation Company's boat, the *Araucania*, built 28 years ago by John Elder & Co., but recently fitted with new triple-expansion engines and boilers at Barrow; the *Werneth Hall*, a fifteen-year-old 4,000-ton liner of the Sun Shipping Company; the *Gaboon*, also by John Elder & Co., built for the British and African Company, and the Tyne-built *Mourino*, which is being sold out of the Wilson Line. Such a selection of named ships shows clearly enough how extensive is the firm's connection, and how likely they are to be able to suit inquirers after tonnage, even if, at the moment, it were possible that the exact thing sought were not actually advertised in their lists. They are sure to know what vessels are strongly held, and which owners would be tempted to sell by a good price.

The South Eastern Railway.

After its long course of unenlightened warfare with its neighbours, is now becoming a very up-to-date line. It is putting on modern rolling stock, and recognising at last that decent attention to the wants of the public is the only way in which a railway can permanently benefit itself. Amongst other matters it has given great attention to its continental traffic. A new afternoon service to Paris, *via* Boulogne, has been inaugurated. It is hoped that in some measure, at least, this will fill the gap left by the discontinuance of the Club train service. In connection with this new facility they are running their new paddler, the *Duchess of York*. A fine boat she looks externally. I met her outside Spithead when *en route* to the Naval Review, and saw that she had a smart appearance and considerable speed. Then they have bought the old Zeeland Hotel at Boulogne, and are doing all they can to develop the local traffic between that pleasant watering place and British centres of population. It is this which brings me to the subject in this column, for I have received a very

beautifully got-up book about Boulogne. The cover is printed in colours with exquisite taste, and represents on the front a couple of Normandy fisherwomen in their characteristic costume, and gives on the back a good general view of the Casino. The interior is devoted to an account of the town, its attractions, and its suburbs. Throughout it is well illustrated, and makes one long to revisit the place. But there is little reason why anyone who has a day and a sovereign should not do so, for besides the South Eastern there is *La Marguerite*, which takes one direct from London, and will, if need be, bring one back in the day. Time was when one was proud of having left London in the morning by train and crossed the Channel twice in the day, getting back in time for the evening meal. Now with these facilities hundreds of excursionists do it easily and cheaply daily by water all the way.

The "Oceana"

is one of the Jubilee vessels of the P. & O. Company, and, being therefore but ten years old, and fitted with triple-expansion engines, can hardly be considered anything but one of their crack Australian team. One is, therefore, much surprised to read the case of the Queensland Bank *v.* the P. & O. Company, just tried in the Commercial Court, where some bullion was stolen whilst in transit from Melbourne to London on board the *Oceana*. The owners claimed against the steamship company for its value, as they alleged that the ship had not proper facilities for its carriage. The steamship company, however, contended that they were not bound to have a bullion room. This contention, be it said, did not find favour with Mr. Justice Mathew, who held that they who undertake to carry bullion must provide proper facilities for its carriage. It is somewhat of a revelation, however, to learn that bullion rooms are in the eyes of those who direct the fortunes of Sir Thomas Sutherland's great company, like twin-screws, an unnecessary and expensive luxury in modern mail steamers. Experience will, however, show that cheapness in first cost does not always mean economy in the long run.

Railway Experts and Shipping Matters.

Most people, except, of course, the unfortunate investors who have been led to place their confidence in its future—have long ago forgotten that such a place as Milford Haven exists. Indeed, for commercial purposes, it is yet unborn. One is somewhat amused, therefore, to read an interview with Mr. J. L. Wilkinson, the general manager of the Great Western Railway, in a new monthly magazine. This gentleman, being asked as to the future developments of his system says "sooner or later—and perhaps sooner than many expect—Milford will become *the* port for dealing with an extensive oversea traffic, which traffic the Great Western Railway will be glad to accommodate. When the time comes, it is possible that the Paddington-Milford boat specials may be the "crack trains of the world." Mr. Wilkinson speaks of the future as assured, though he is wise enough not to say how soon Milford will supplant Liverpool and Southampton and Plymouth all at once. One may charitably hope that Mr. Wilkinson may live till the time comes. I think railways and steamers will have developed a good deal before them, and I only trust that Mr. Wilkinson has more knowledge of railway matters than he appears to have of those which pertain to sea-passengers and mail steamers.

The fact is, that because a man understands railway matters it does not at all follow that he is qualified to speak on shipping affairs, though he seems to be the last person to realise his want of capacity. I have, on more than one occasion, referred to a Canadian railway expert who has been writing with much vigour and persistency upon the Canadian mail question and who has urged the claims of various unknown and obscure places as termini for the new service. He is not yet discouraged, and even at the beginning of this month had started a new hare altogether. As the *S. Lawrence* is not to be abandoned, in response to his efforts, he now urges that the Cabot Straits should be substituted for the straits of Belle Isle, and that Sydney, Cape Breton, should be made a summer port of call. One cannot help admiring the way in which, when one point is lost, he is ready with fresh, and always impracticable, suggestions.

The Cunard Steamer "Samaria"

got a very handsome award in the Admiralty Court for the services to the Norwegian sailing ship *Schiffswerft*, as mentioned in the April Notes. The Court awarded no less than one-half the value of the ship and cargo saved. This is a very large proportion indeed. But the judge thought that the property was saved from almost certain destruction in bad weather, and the value was, when reckoned out, so small, that the individual members of the crew would not get much. For the total award of £1,854, the owners got £1,154, the captain £200, and the rest of the crew £400 amongst them—those who went to navigate the derelict getting double portions. This division leaves £100 unaccounted for, and that sum was further divided amongst the prize crew, the officer in charge taking a third of it. The judge spoke very highly of the service and considered that the risk these men ran of going down with the prize was a very substantial one.

The Neighbourhood of Socotra

has been the scene of two most terrible disasters, in each of which a steamer of the P. and O. Company played a very conspicuous part. The first of these was the loss of the steamer *Sultan*, bound for Jeddah with pilgrims from Bombay. She encountered the full fury of the monsoon and became unmanageable. Her hatches were beaten in by the seas and it was seen that she could not long be kept afloat. The terrors of the position were aggravated by the fact that the heat was so intense and pitiless that many of those on board were incapacitated from doing anything towards the preservation of the ship, even if anything could have been done. At last the P. and O. mail boat *Valetta*, bound to the south, hove in sight. So violent a sea was running that she could not at first launch a boat, and she signalled to those on board the *Sultan* to wait before they attempted to do so. But patience was hardly to be expected under the circumstances and a desperate attempt was made with the result that the boat was swamped and those whom it contained were lost. But the horror of the people on board the sinking ship was rendered more intense by the fact that these wretched persons were devoured by sharks in full view of their late shipmates. Attempts were made to get away other boats but these, too, failed. At last the *Valetta* succeeded in putting a boat safely in the water, and this effected the rescue of those who were left aboard the ill-fated *Sultan*. Many of them, however, were suffering from very serious injuries. It is altogether a horrible story. But one cannot but reflect on the pluck of the boat's crew of the *Valetta* who ventured on their errand of mercy after seeing the fate which would await them if they should happen to be capsized whilst performing the always hazardous boat service. Four of this boat's crew came from the steward's department. The other casualty is the loss of the P. and O. steamer *Aden*, homeward bound from Japan with passengers and tea. She went on to the rocks at the eastern extremity of the island of Socotra. The horrors of the wreck appear to have been almost unexampled. The vessel struck at three o'clock in the morning, but the circumstances attending her doing so are not likely to transpire with any great amount of detail, as the only officers left are engineers. The monsoon was blowing with exceptional violence, and three of her six boats were at once carried away. It would have been better, perhaps, if they had all gone, for their use only led to loss of life in peculiarly sad form. It was thought—and, apparently, with every reason—that the ship would go to pieces almost at once, and so a proper and natural attempt was made to make use of those boats which were left. But with the heavy sea which was breaking it was only possible to get one of them away in safety, and upon her were embarked a large part of the European crew. Then orders were given for the ladies to follow. Fortunately for themselves, many of the ladies preferred to share the risks of remaining on board with their husbands. The boat was—according to the account of a survivor, who published a very graphic account of his fearful experiences in the *Times*—not provisioned at all. For it was thought that she would make a trip to the shore, land her passengers at once, and come back for another load. For this reason it was, too, that the Europeans were chosen to man her, as they were more likely to be able to withstand the strain of the service. But the force of the gale was greater than had been reckoned for, and these unfortunate persons were carried out into the Indian Ocean.

The sight of such a passing away of their friends and shipmates must have aggravated the distress even of the situation in which those remaining on board found themselves. But they soon had enough to think of in regard to their own dangers. The seas became heavier, and swept the wreck more remorselessly. The captain, who remained on board, sustained a compound fracture of the leg, and was then swept away. So were ladies and children, the survivors scarcely caring to prolong their own misery, and being powerless to render much assistance. But it

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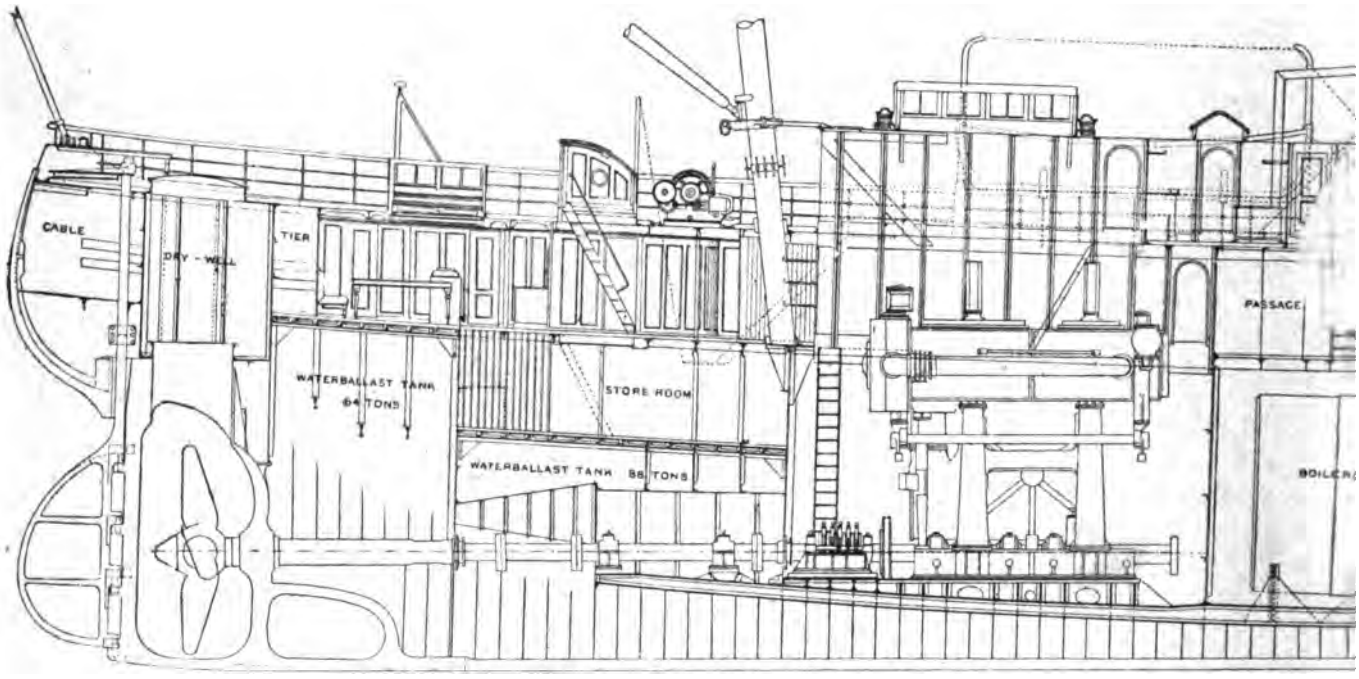

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is useless to dwell on all this. Suffice it to say that all who remained on the wreck, be they the engineer officers, the European passengers, or the despised Lascars, behaved in a way that was fully worthy of the ensign which still floated Jack downwards at the masthead. Nearly all sustained serious injuries from being dashed about the wreck. Fortunately the weather moderated somewhat after a time. But for seventeen days the survivors were imprisoned on the remains of the *Aden*, and from time to time had the discouragement of seeing steamers pass without taking any apparent notice of them. But, in fact, they were reported, and the Indian Marine steamer *Mayo* was sent to their assistance. Even then it was a difficult matter to get a boat launched and the people off the wreck. No doubt an inquiry will be held, and so the causes which led to the stranding must not be discussed now. But this seventeen days' imprisonment under such conditions is a matter which seems to outrun imagination in horror.

A Safety Appliance.

In this connection I may mention an appliance which is now on view at the Yachting Exhibition at the Imperial Institute. This is the line-throwing gun of Captain D'Arcy Irvine, R.N. It is a patent which has seen something more than official trials, for it is already in use by the Corporation of Trinity House, and it has seen active service on the Irish Coast, where Captain Irvine resides. On the occasion of which I speak it is believed that but for its timely aid a distressed vessel would have been driven on to a lee shore and totally destroyed. The trouble with all these ingenious safety appliances is that the statutory demands upon shipowners in regard to life-saving appliances are already so full that there is a disinclination to add any voluntary burden to those already imposed by Parliament. But the cost of this addition to a steamer's outfit is very trifling, and it would prove invaluable in the now very frequent occasions when big single-screw steamers break down at sea and have to accept assistance by towage. Many readers will remember having seen the appliance in use at the Naval Exhibition. Those who do not can see it at work any afternoon at the Imperial Institute.

The Strength of Modern Ships

was exemplified in the experience of the *Aden*, which withstood the terrific hammering of the continuous gale as she lay so many days on the rocks, until at length assistance came to the unfortunate survivors of her wreck. Sir Raylton Dixon may well be proud of the good workmanship which his firm—now by-the-way just taking advantage, for private reasons, of the Limited Liability Acts—put into the hull of the ill-fated vessel.

Now one sees another example of what modern ships will stan. It will be remembered that the Warren liner *Angloman* was wrecked on the Skerries when homeward bound with a very valuable cargo early in February of the present year. She fell over on her side, and a good deal of cargo was washed out of her during the exceptionally heavy weather which prevailed in March. Yet she has held together ever since, and much salvage has been made.

Those interested have, therefore, been emboldened to hope that the hull may yet be saved entire, and accordingly they have advertised for tenders for raising her. This is a feather in the cap of the Birkenhead firm of Laird's, who were her builders. She, like the *Aden*, was just five years old at the date of her loss.

Lieutenant Clifford, R.N.R.,

of whom I spoke last month, has had, since then, several valuable

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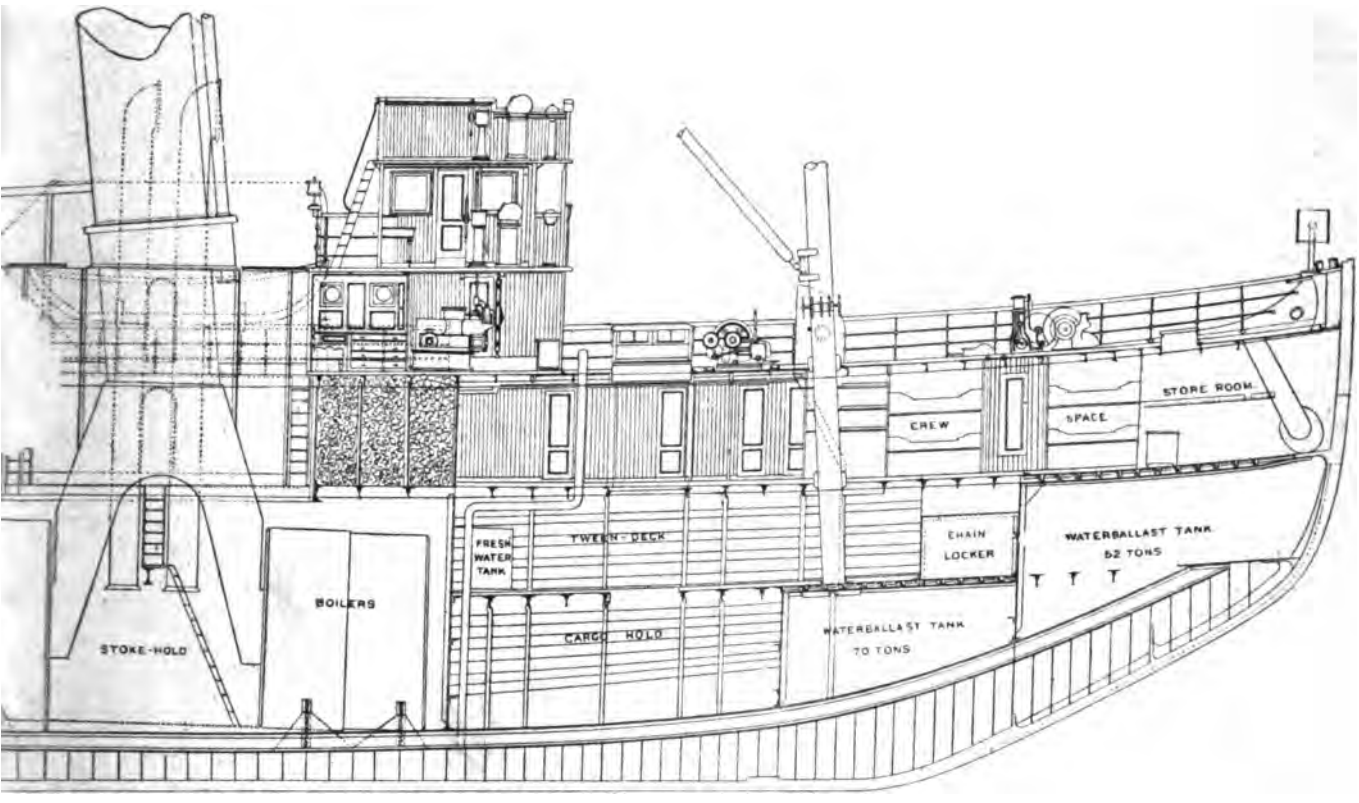

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tokens of the public esteem in which his deed has been held. The relatives of Mr. Barnato have presented him with the sum of one thousand pounds, and a South African newspaper opened a subscription amongst its readers for his benefit, and this resulted in a cheque for another two hundred. Besides this, Lloyd's have given him their medal. But there is a more interesting result of the affair according to a story which appeared in the columns of the *People*. It is a little romance which ought to be true, if it be not. Our contemporary alleges that, on a previous trip, the fourth officer of the *Scot* met, and fell in love with, a young lady passenger, daughter of one of the numerous South African millionaires, who travel backwards and forwards between England and the Cape. The lady reciprocated his affections, but her father had more ambitious ideas for his daughter, and set his face strongly against the match. Lieutenant Clifford's heroism, however, had a softening influence upon him, and the millionaire gave way altogether when he had the influence of the successor in business to Mr. Barnato brought to bear on him, and learnt that that influence would in future be exerted in favour of the sailor. He must now be deemed a fortunate man indeed.

The Curious Ill-luck

which ever attends some ships is well shown by the history of the *Spree*. As my readers know, she and her sister, the *Havel*, are intended to be improved *Lahn's*. The latter was the last ship built for the North German Lloyd Company at Fairfield. She is also one of the most successful ships her owners ever had. But when new express steamers were required to follow her the company thought that the time was come when German yards could supply all they wanted, and so the *Havel* and the *Spree* were made in Germany. The *Havel* has had a fairly uneventful life, but the *Spree* has had trouble more than once. Her first serious mishap was on the occasion when she broke her shaft in the Atlantic, and was towed into Queenstown by the *Lake Huron*. The latter was awarded a very large sum as salvage, and, indeed, earned it, for the service was important, the values very large and the risk very serious. For the broken shaft had holed the skin of the disabled ship, which not only was thus deprived of all motive power, but had also two compartments filled with water. Her after saloon deck was under water when she came in. The amount of award, repairs and costs, must have been a very large sum altogether.

Her next misfortune was the stranding on the Warden Ledge on the Isle of Wight, a casualty which many persons believed would result in her case in a total loss, as did the accident to the same company's *Eider* in the same waters.

Now she has again broken her shaft, and again been s ved. This time by the s.s. *Maine*, of the Atlantic Transport Company. It appears that the *Spree* was some six days out from New York, and some 630 miles west of the Fastnet, when, on the morning of the 2nd July, her crank shaft—which had previously caused the engineers some anxiety by the appearance of a flaw—broke altogether. The vessel was, of course, entirely helpless. She has no sail which could be of much assistance to her. For three days she drifted, going in that time 90 miles to the eastward and 43 to the southward. On the 5th inst. the *Maine* came up, being bound from Philadelphia, and thus taking a course somewhat more to the south than the *Spree*, which had sailed from New York for the Channel. The two vessels were connected up, and on the morning of the ninth the *Spree* was brought safely into Queenstown. The distance towed was somewhere between 500 and 600 miles, and the speed for the four days veraged about six knots.

It is curious to note that the *Spree*, as yet one of the two finest and largest North German Lloyd boats, is now taken off the Southampton route altogether. She is plying between Bremen and New York still, but her port of call is Cherbourg, not Southampton. The company's sailing lists, too, show that when the new flyer *Kaiser Wilhelm Der Grosse* comes on to the station, she will take the place of the *Havel* on the Southampton line, and the latter will also go *via* Cherbourg.

This move is capable of three explanations. It may be that the Southampton traffic is disappointing, or that special efforts are being made to encourage the new route *via* Cherbourg. But it may also be that the older Clyde built steamers, the *Lahn*, the *Saale*, and the *Trave* are more satisfactory vessels than the *Havel* and *Spree*. Which of these suggestions is correct I don't know, and we are very unlikely to get light from other sources.

The *Spree's* experience would, one would imagine, convince the North German Lloyd Company that they were none too premature in adopting the twin-screw principle, and might well make P. & O., and the Castle Line to the Cape, wonder if they have done well to build so much superior tonnage of late years on the obsolete single screw system.

Talking of this reminds me that there are renewed rumours that an attempt is to be made to raise the ill-fated *Elbe* from her bed in the North Sea, between Lowestoft and the Dutch coast. It will be surprising indeed if these rumours have any solid foundation, as the evidence at the time seemed to show pretty conclusively that the vessel broke her back as her heel touched bottom. Even if this were not the case one might well assume that, in the time that has elapsed, her decks have fallen in and that she has become so much a wreck as to be quite unequal in value to the vast sums that would necessarily be spent in raising her. It may perhaps be of interest in this connection to mention that the *Crathie* has found a purchaser, and under a new name is trying to live down the sailor's prejudice against what are considered unlucky ships.

The West India and Pacific Company's

steamer *Floridian* did a useful piece of work in towing into Queenstown the *Cephalonia*, of the Cunard line, about the same time as the *Spree* was in trouble. The *Cephalonia* was homeward bound from Boston when she, too, broke her crank shaft. She was brought a distance of 423 miles by her rescuer, and after discharging her mails and passengers was handed over to tugs and taken to Liverpool for repairs. The *Cephalonia* and her cargo were only valued at £68,000, so that the salvage award of £3,000 was a very considerable one under the circumstances.

A new Limited Company.

The Allan Line has made the last days of June mark a great crisis in its history, for it put itself under the Limited Liability Acts. It has a capital of £650.000 in £10 shares. The public have not had the opportunity of subscribing as the members of the firm have taken all the capital. There are eight directors, of whom seven are members of the family from which the line takes its name, and the other, Mr. Dunlop, who has of late years been so closely identified with the fortunes of the company.

The Jubilee Honours

contained a great many names, yet there were far more disdisappointments for those who were not included. Marine engineers must all have been pleased to see that a K.C.B. was given to the Engineer-in-Chief of the Navy. The chairman of one of our oldest company's received a peerage, and Cunard's may be congratulated on the honour bestowed upon the gentleman at the head of their affairs. Some comment has been aroused by the fact that Mr. Ismay had no distinction. Certainly, if there had been any desire to honour Liverpool, no more fitting person than the head of the White Star Line could have been chosen to represent it. But for himself, Mr. Ismay is not likely to accept any honours. He has repeatedly refused them. Even the chairmanship of the London and North-Western Railway, a position of far greater importance, as far as revenue goes, than most European kingdoms, he has declined, and he seems to prefer to be known and respected as the Mr. Ismay who devotes himself chiefly to the great business he has founded, and in his leisure evolves schemes for the self-help o those whom he employs. The Aged Mariner's Home, on the Banks of the Mersey, is more of a pride to him than any title.

Speaking of Mr. Ismay reminds me, that in looking over a newspape cutting book the other day, I found a note, of date September, 1892, which gave a full, true and particular account of a new 700 ft. White Star boat which was then building—so it was alleged—at Belfast. She was to have had triple-screws, an I.H.P. of 45,000, and a speed of 27 knots on trial. She would be at work in April, 1894. But in those days she was spoken of as the *Gigantic*. It is remarkable that the idea of the great vessel should have got about five years ago, and after laying dormant for so long, should, in so many particulars, have proved itself prophetic. The size is correct enough. How far the speed is an exaggeration another year will show. The triple-screw idea was, of course, quite wrong. But the foreigner was building triple-screw steamers at that time.

The Compagne Generale Transatlantique

has not added of late to its tonnage. It complains, in its annual report, that the restricted size of the French harbours, as well as British, German and American competition, renders its progress in the New York trade very difficult. But it is about to build very largely. Its new boats are to be of 22 knots speed. The first is to be ready in 1900. Two more will follow at intervals of two years each, and a fourth will be ready in 1908. This is looking a very long time ahead indeed, and, though from what I can hear, I imagine that the design is much like that of the *Campania*, it does not follow that these vessels when they come out will be up to the standard of the day. We may be having vessels driven by steam turbines eleven years hence, and be wondering how we were ever content to crawl across the Atlantic at 22 knots.

An Engineer's Feat.

It is pleasant to note that the underwriters interested have recognised the skill and perseverance of the engine-room staff of the steamship *Oceanic*, of Sunderland. The vessel broke her tail shaft at sea when on a trip from Natal to Elephant Point in ballast. The propeller dropped off. Fortunately there was a shaft and propeller on board. But these would have been of little avail without the determination of the men who were charged with the management of the ship. The vessel was tipped, the new screw and propeller shipped, and the vessel enabled to proceed on her voyage. This service occupied eight days and-a-half, and, of course, involved all hands in some part of the work. The underwriters resolved to distribute a sum of £350 amongst those who saved their property from the certainty of a heavy salvage claim.

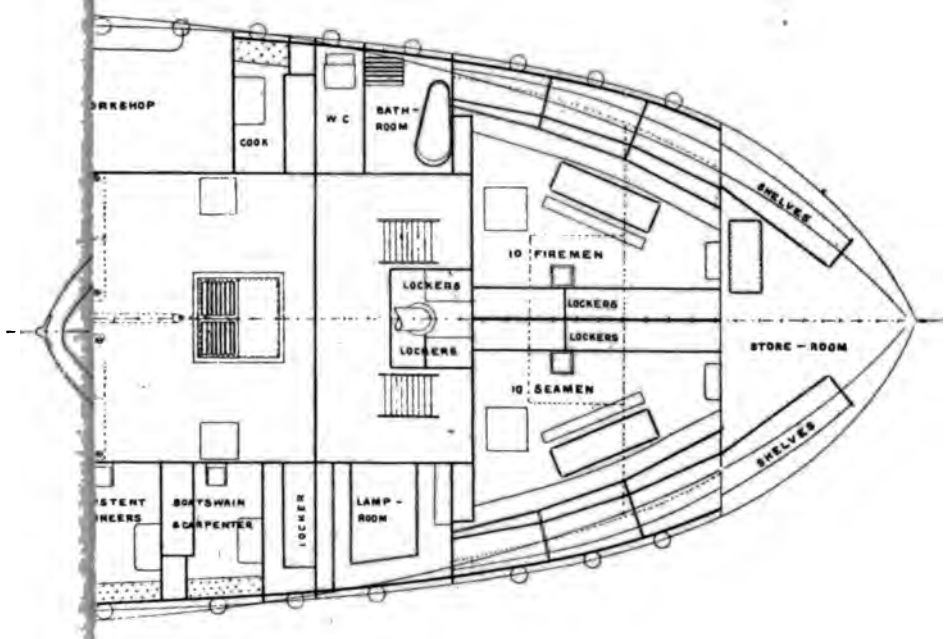
The Canadian Mail Contract.

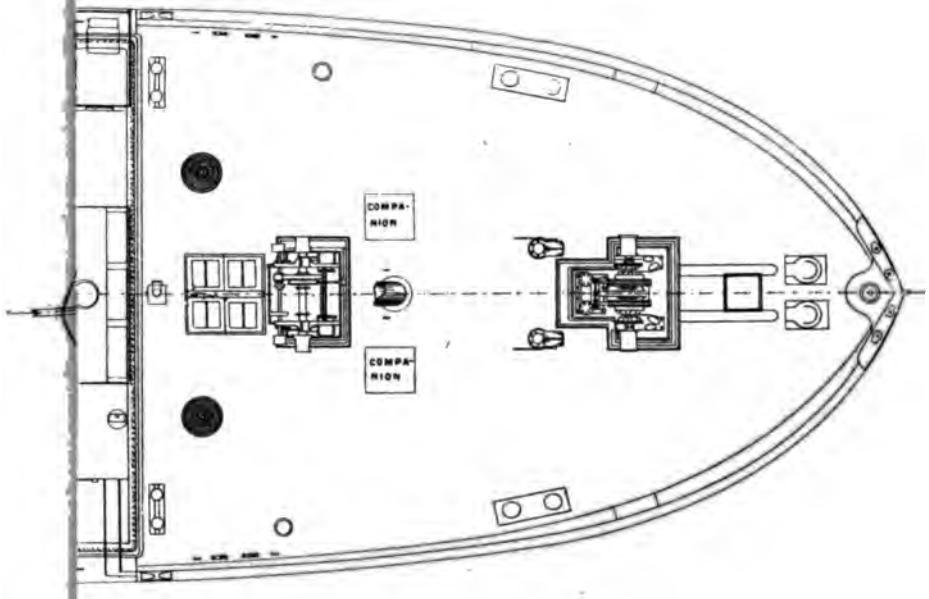
It is hard to say how much further matters in this regard have really advanced in the month. Yet a good deal of ink has been used during the period and much discussion has taken place.

All we know is that the sixty days in which the contractors have to deposit their caution money had not expired on the 22nd July, when the subject was mentioned in the House of Commons, and, that on that day the money had not been paid to the knowledge of her Majesty's Government. But the amount of the caution money, though, of course, a large sum when spoken of generally (it amounts to £20,000), is a very trivial matter in comparision with the cost of the ships to be built. Much less is its importance in regard to the expenses of running such a line as is contemplated. I do not therefore attach very much weight to the deposit or non-deposit of this sum, save in so far that, if it were not deposited within the time limited it might be that Messrs. Petersen Tate & Co. would definitely and at once lose their contract.

But meanwhile they have, according to the correspondent of the *Times* in Canada, raised the money they require. This information has not been confirmed, and it would appear that they are in some little difficulty with their constituents at home.

Their chief claim to fame as shipowners has been as the managers of the Turret Steamship Company, Limited. This concern owns some half dozen modern cargo steamers built on Messrs. Doxford's patent turret principle. Now, at the end of July a special meeting of the shareholders of this company was summoned for the purpose of approving of a sale which it was proposed should be made of all the company's property to Messrs. Petersen, Tate & Co., for the purpose of enabling them to make a re-sale to the new company, which is about to be formed for the carrying out of this mail contract. Amongst the shareholders in the Turret Steamship Company, are Messrs. Watts, Watts & Co. who are well-known shipowners of considerable experience, and they circularised the shareholders in order to dissuade them from giving their consent to Messrs. Peter-





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sen, Tate & Co.'s propositions. In the results there seems to have been some further misunderstanding between the parties immediately concerned and the matter is hung up for a time whilst a committee of shareholders in the Turret Steamship Company enquire into its affairs. Without wearying one's readers too much, therefore, one may take it that much progress towards the inauguration of the service has not yet been made, and that the path of the intending contractors is not altogether strewn with roses. It will be therefore the more to their credit if they carry the business through with success.

SHIPYARD MANIPULATION OF COLD STEEL.

THAT the makers of modern steel are richly entitled to a share in the credit attaching to the great developments which have taken place in the shipbuilding, engineering, and boiler-making industries within recent times is generally recognised; but what seems to be scarce sufficiently appreciated is the length to which they—in conjunction with the manufacturers of machine tools—may yet lead the shipbuilder and others under obligation. The homogeneous and malleable qualities of the steel now supplied to builders have rendered possible many "new departures" in the practice of manipulating it, which not so long ago would have been considered quite impossible. This especially applies to its manipulation in the cold state. There seems to be no end to the production of tools of enhanced power and calibre for bringing to bear on this marvellously adaptable material. The processes of rolling, bevelling, flanging, and joggling plates in the state in which they come from the storeyard, are now common in almost all yards of any importance. They are carried out without injury to the material, or if injury be done it is inevitably followed by rejection. In this way all material standing the ordeal has an absolute guarantee as to quality. The joggling of steel plates is the most recent, and not the least trying of the processes of cold-working introduced. It has obtained quite a firm footing in the yards of the North-East Coast, through its intrepid adoption by Messrs. Doxford & Sons, of Sunderland, who have also done much to render the system practicable and efficient by the invention of the joggling machine bearing their name. This machine, and the joggling of plating by its means, are now matters receiving attention and adoption in at least two of the foremost Clyde yards, viz., Fairfield and Denny Bros., Dumbarton; and extension of the practice is only a matter of time. Already Messrs. Denny have turned out one large vessel for Messrs. P. Henderson & Co.'s line to the East, and at present three large steamers are on the stocks for the British India Steam Navigation Co., in all of which the joggled system of plating obtains.

Further advantage is about to be taken of the marvellous adaptability of modern steel to be worked in the cold state in a direction quite as important as shell plating. This is the bending and bevelling of ships' angle frames, for which operation we believe a machine-tool is at present being perfected by the inventors, two young English engineers. In the existing mode of bending and bevelling frames, or other curved angles, the material must first be heated in a furnace. Machines for giving the requisite bevel to the frames at the bow and the stern are in use in most large shipyards, but in this case, also, the material must be in the heated state. The new machine does both bending and bevelling simultaneously, the heating of the material being dispersed with entirely. The machine, as yet, has not been carried to its perfected form, but already it has been seen in operation by representatives from some of the largest shipbuilding firms in the country, and the action of the machine as well as the work produced have favourably impressed many of them. Should this invention be thoroughly perfected, and receive adoption in daily practice, a very considerable economy in labour will result, and the "art" of frame bending and bevelling will become more of a mechanical process than before.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

IT is almost too late now to refer to the great Naval Review which took place at Spithead on June 26th, but we must at least chronicle its entire success. It was not only because it afforded a brilliant spectacle that it attracted attention, but it was also an object lesson to the world at large. The feature which appears to have been most striking to foreigners was the uniformity of type in the new vessels. There can be no question that this characteristic is one that meets with approval from all professional men and excited the envy of many. It is most gratifying to be able to say that everything passed off without a single hitch. There were no accidents and no mishaps to mar the splendour and brilliancy of the marine pageant. Those who had the felicity of being present on this historic occasion witnessed a scene they will remember all their lives. There is another matter in connection with the review which must not pass without mention. Of the vessels which took part, only a very small proportion, and these the ships which are employed in our training squadron, were not absolutely effective and ready to proceed into action if required. This fact received a striking demonstration before the week was out, for the greater part of the vessels then weighed anchor to take part in the manœuvres and the mimic warfare for which they had been mobilised. By some it may be considered a pity that in such a year as this the pageant at Spithead was not repeated on a smaller scale in other ports of the country. There is no gainsaying the fact, however, that the ships were employed more usefully and in a manner which, after all, better fulfils the purpose for which they were called together.

The Naval Manœuvres.

This year a new departure was made in connection with the manœuvres, the ships being divided into two fleets, each of these being subdivided into two divisions. A separate scheme of operations was arranged for each fleet, each being given a problem to work out, in which one division was pitted against the other. In the first fleet the 1st division, under Vice-Admiral Sir H. F. Stephenson, consisted of the six battleships—*Majestic*, *Prince George*, *Mars*, *Jupiter*, *Victorious* and *Renown*, with the ten cruisers—*Powerful*, *Terrible*, *Naiad*, *Latona*, *Thetis*, *Tribune*, *Sirius*, *Terpsichore*, *Pelorus*, and *Halcyon*. This division had its headquarters at Loch Swilly. The 2nd division of this fleet was placed under the command of Rear-Admiral Fellowes, and consisted of the five battleships *Magnificent*, *Royal Sovereign*, *Resolution*, *Repulse*, and *Empress of India*, with the nine cruisers *Blake*, *Blenheim*, *Charybdis*, *Hermione*, *Spartan*, *Sappho*, *Andromache*, *Magicienne*, and *Speedy*. These vessels proceeded to Blacksod Bay, on the north-west coast of Ireland. The scheme of operations which these two divisions were ordered to carry out may be best described in the "general idea" issued for the purpose. "In anticipation of war a squadron puts to sea from Blacksod Bay, leaving a cruiser behind to bring on new that war has been declared. This cruiser, under orders to proceed direct to a rendezvous at a fixed speed, is followed some hours after she has started by two cruisers of an opposing squadron, with the object of discovering the position of the enemy and informing their own Admiral, who has put to sea from Loch Swilly, so as to enable him to prevent the return of the enemy's squadron to Blacksod Bay by intercepting it at sea. The area of the manœuvres was contained within a circle of 350 miles radius drawn from Blacksod Bay and limited by the 52nd parallel of latitude to the south and by the 7th meridian of longitude on the east. The time to be devoted to the operations was 90 hours from the declaration of war."

The Operations of the Channel Fleet.

The main purpose of these operations was to put in practice a method of finding the position of a cruiser which has been prepared by two French naval officers, and which is known as the "curve of search." The vessel left behind by the 2nd division was the *Blenheim*, and the two cruisers ordered to look for her, the *Powerful* and *Terrible*. Owing, however, to the tactics of Admiral Fellowes a fair trial of the method was not obtained. This, however, is the less to be deplored since it is perfectly obvious that by a very slight alteration of course on the part of the vessel chased the curve of search is rendered useless. What happened was this—Admiral Fellowes, after leaving Blacksod Bay, detached from his division a small squadron of cruisers with instructions to join the *Blenheim* soon after she left port and convoy her to the Fleet. It is evident by so doing that he made it impossible for the *Powerful* and *Terrible* to fulfil their object even had they sighted the vessel of which they were in chase. He then made his way towards the rendezvous in such a leisurely manner that he was soon overtaken by his cruisers, whereupon he returned to port and claimed to have successfully performed his share of the

operations. The Admiralty, to whom he had reported his proceedings, appear to have thought otherwise. since they ordered him by telegraph to put to sea again, and once more proceed to his rendezvous. His tactics rendered the operations abortive, for the 1st division of the fleet, having searched for him to the westward without success, returned to the vicinity of Blacksod Bay, and there re-awaited him, and by this time the limit assigned to the operations had come to an end.

The Operations of the Reserve Fleet.

The other fleet left Spithead a day later to conduct its own manœuvres. The 1st division, under the command of Vice-Admiral Compton Domvile, was composed of the six battleships, *Alexandra, Benbow, Howe, Collingwood, Devastation* and *Colossus*, with the nine cruisers, *Australia, Venus, Diana, Isis, Melampus, Apollo, Æolus, Phæton*, and *Hazard*. The headquarters of this fleet was at Milford Haven. The 2nd division, in charge of Rear-Admiral Pearson, comprised a battle fleet of five, two of which were cruisers acting as battleships for the occasion. These five ships were the *Sans Pariel*, the *Edinburgh*, *Thunderer*, *Warspite*, and *Aurora*. Eight cruisers were also attached to the division, the *Galatea, Dido, Juno, Doris, Mersey, Leander, Brilliant*, and *Antelope*, This division proceeded to Berehaven before the commencement of the operations. The problem given to the Reserve Fleet to work out was as follows: "News having been received that a hostile squadron (2nd division) has been ordered to be at one of two rendezvous on a certain date, with the object of making a sudden descent from the nearest of them on Berehaven or Falmouth, as may be decided at the last moment by the admiral, and it having transpired not only that both rendezvous are equi-distant from Brow Head, in Ireland, and over 100 miles apart, but that one is as far from the Fastnet Rock, as the other is from St. Mary's, Scilly. The defence squadron (1st division) is ordered to put to sea from Milford Haven, and endeavour to intercept it before it can reach either port. Area of manœuvres: Within a circle of 220 miles radius drawn from the Fastnet Rock, and bounded to the north by the 52nd parallel. Time of operations; Ninety hours from the declaration of war."

Working out the Scheme.

It is apparent from the above description that the scheme offered to the Reserve squadron was mainly of a geometrical nature. With the data at his disposal the Admiral of the first division was able to locate approximately the rendezvous through which the enemy had to pass to make his attack, and he was further informed that the hour at which Admiral Pearson must be at one of these rendezvous was midnight on the Saturday before the war terminated, this taking place at six p.m. on Sunday night. The enemy was permitted to put to sea twenty-four hours in advance of the pursuing squadron. They had therefore time to get well away before the cruisers of the first division could proceed in chase. The method of search chosen by Admiral Domvile was to station his battle fleet midway between the supposed positions of the rendezvous, while his cruisers searched the area to the southward. His idea was that if no trace of the enemy was seen in that direction within two hours of midnight on Saturday, he could then make up his mind that Admiral Pearson's objective was Berehaven. But on the other hand, if his cruisers were successful in finding the enemy anywhere in the vicinity of what was supposed to be the location of the eastern rendezvous, then it might be taken for granted that they intended a descent upon Falmouth. At about one o'clock on Saturday night his cruisers brought to Admiral Domvile intelligence that they had discovered the enemy's battle fleet, and he thereupon steamed direct to Falmouth, there to await the arrival of the foe. As it turned out, his anticipations were fulfilled to the letter, and on Sunday evening, as the defending division cruised off the threatened port, Admiral Pearson's vessels were seen approaching, with the result, of course, that their intentions were entirely baffled.

Lessons of the Manœuvres.

There can be no doubt that in spite of the partial collapse of the operations of the Channel Fleet, the manœuvres have been most useful and instructive. It is not only that many lessons, especially in the utilization of cruisers for scouting will be obtained from the operations of the two fleets, but most valuable work was also done in the direction of training officers and men. It is satisfactory to learn also that no serious mishap occurred either to their machinery, their crews, or to the ships themselves. Some of the vessels, a very few, suffered partial disablement; the *Mars*, battleship, was obliged to put into port for repairs, and sundry other defects developed themselves. On the whole, however, it must be said that all the vessels acquitted themselves well. Special interest attached to the *Powerful* and *Terrible*, and from the reports of the correspondents it seems clear that these vessels are a success. Those fine second-class cruisers, the *Diana* and her sisters, behaved also most satisfactorily. It was stated, it is true, that the *Diana* had had a breakdown, but this has since been shown to have been a mistake. We cannot but feel that the authorities are to be congratulated both upon the success which attended the Review, and upon the fairly satisfactory results of the subsequent operations.

Portsmouth Dockyard.

The work on the battleships now in hand at this yard makes fair progress, but the *Canopus* has forged ahead much faster than either of the three. She has received her stem piece and stern post, and even at this early hour the question as to who shall be her sponsor at the launching ceremony has been mooted. The *Gladiator* has been getting on rather slowly, but now she is certainly making progress, and extra hands have been drafted on to her. It is not expected that the *Cæsar* will go out of harbour until the end of this month, an arrangement by which the *Illustrious* at Chatham will be able to have her trials first. By far the greater portion of the eighty six apprentices who entered the dockyard as the result of the April examination were in favour of becoming engineer fitters when the question of the trade they preferred was put to them. Taking it all round there is little doubt that they have chosen wisely. The most successful of these has a chance of becoming an engineer student and the most successful of the remainder, who chose to become shipwright apprentices, may finally be drafted into the Royal Corps of Naval Constructors. The torpedo boats commissioned for the Review have paid off, and the same is the case with the *Royal Arthur*, which will recommission at the end of this month with a fresh crew for the relief of the *St. George*, now acting as flagship on the Cape of Good Hope station. It is worthy of mention that the Lords of the Admiralty have expressed their appreciation by letter of the excellent work done by the Jubilee Reception Committee, an appreciation which, considering the valuable work done, was deserved.

Cape Colony's Gift.

The gift of an ironclad to the British Empire by the loyal people of Cape Colony cannot fail to cause a thrill of pleasure throughout Great Britain and her other colonies. The announcement came as the greatest surprise when it was given out by the First Lord of the Admiralty. The gift, too, is accompanied by no conditions whatever, and the vessel is to take its place side by side with those paid for by the British taxpayer, and is intended to add to the power of the Empire. The present year of grace has witnessed many stirring scenes and incidents marking the closer union of Great Britain and her colonies, but Cape Colony's gift is certainly among the most noteworthy. It is an extremely handsome Jubilee present, and the outburst of patriotic enthusiasm called forth by that part of the First Lord's speech in which he announced the gift had in it a thrilling power which we doubt if it has been exceeded in volume or earnestness during the whole of the Jubilee festivities. As Mr. Goschen remarked, it cannot obliterate the memory of Australia's pioneer contribution to our naval expenditure. Of the spirit which prompted this magnificent addition to the sea power of the British Empire we have had many examples in times gone by. The silken ties which bind the colonies to the Mother Country are thus proved to be stronger than any other. The value of the gift in hard cash is but a secondary consideration, yet it is worthy of mention that the cost of a first class modern battleship is nowadays something between three quarters of a million and a million sterling, and the Cape Colonists should be heartily thanked by the Government and the nation for their generous act.

The French Naval Manœuvres.

The tactical and strategical operations carried out by the French Navy were on a somewhat less extensive scale this year than has been the case in former years, although the length of time taken up was considerably longer than our own. They were of a similar nature to the various evolutions carried out during the year in the ordinary course of events. At the end

of the first week's manœuvres, which included evolutions and target practice, the two divisions returned to Brest and Cherbourg. On the 15th the second period of operations began, and were extended until the 24th. Towards the end the Northern Squadron anchored off Quiberon Bay, and was supposed to represent a French force which had for its duties the protection of the coast-line between Rochefort and Brest against the attacks of an hostile force. The squadron, which had for its purpose the defence of the coast-line, was reckoned to be somewhat superior to the enemy and, obeying orders, on hearing of the approach of the attacking vessels, left the port to watch for them. The idea was that if the enemy could keep his position for six consecutive hours of daylight without coming into contact with those on the watch for him he would have practically carried out his purpose. The official result is not yet known. The third period of the operations was taken up with torpedo boat exercises. The opening part of the manœuvres carried out in the Mediterranean included steam tactics, clearing for action, general quarters and coaling, and in what may be termed the active period the plan of operations was somewhat similar to those carried out in the Channel. During the manœuvres some new high explosive shells were tried, but whether successfully or not has not as yet been made public.

Devonport Dockyard.

Affairs at this yard have once again returned to their normal condition, as was expected would be the case at the conclusion of the manœuvres. The *Ringdove*, lately home from the Australian station, in which she completed two commissions, on inspection has been found to be in good condition. She will, it is thought, require but little attention lavished on her, and considering that she has been away for something like six years, some credit is certainly due to the constructive and engineering departments here, as she was engined as well as built at this yard. The old *Vengeance*, one of those included in the Admiralty's last list of vessels for sale, has met with a somewhat strange ending. She has been lying on a mudbank alongside one of the jetties at Keyham Factory for the last thirty years, having been used as a depot ship for stokers, an overflow ship for engineer officers, and torpedo boat store. When she was sold an endeavour was made to get her off this mudbank, in the course of which she unfortunately grounded on an uneven keel, the result being that she broke in twain amidships. It is proposed to attach to this port some twenty torpedo-boat destroyers, seven of which are as yet undelivered. The *Panther* has recently satisfactorily passed her official trials on the Clyde, and the same will no doubt be the case with the *Locust*, these bringing the number up to thirteen, and the remainder are expected before the end of the current year. The *Panther* reached a speed of 30½ knots on the measured mile, and on her full power trial 30·14 knots. The refit of the *Raleigh* is to be a somewhat extensive one, especially as regards her armament, and it is expected that the cost will be something over £30,000. Her 7-in. muzzle loaders are to be dispensed with entirely, and two 6-in. quick firers will take the place of her 6-in. breechloaders. Her torpedo tubes and gear are also to be taken out and returned to the dockyard. The alterations will most probably take until November next.

Machinery at the Review.

A very interesting article which should be read with attention by naval engineers appeared in the *Times* some few days subsequent to the Review. It gave a *résumé* of the progress of marine engineering from the earliest times, asserting, and with a good deal of truth, that Great Britain has as much reason to be satisfied with the engines of her warships as with any other feature of her Fleet, although our designs of war vessels have so largely influenced the construction of the navies of all nations. British marine engineers, said the writer, are copied all over the world with constant fidelity. He refers to marine engineering when the Queen came to the throne as a feeble bantling hardly likely to survive, until the practical introduction of the screw propeller and the substitution of iron for wood in hull construction soon put a different aspect on affairs. Speaking of the *Powerful* and *Terrible* he says they were admittedly the most interesting ships of the fleet from an engineer's point of view, inasmuch as they embodied one of the most important advances ever made at one step in naval engineering practice. From the same point of view he says that the extreme northern line of the fleet was certainly as interesting as any part of the display. In the torpedo boat we have seen in past times the finger-posts to the engineering practice of battleships and cruisers that were to come. Higher steam pressures, higher piston speeds, open column engines, and, lastly, water-tube boilers have all been led up to by the example of these small and comparatively inexpensive vessels. Probably no engineer has more influenced the course of marine engineering practice than the inventor of the torpedo boat. The article is well written and well worthy of notice among the mass of review literature which is now appearing in the monthly and weekly perodicals.

Chatham Dockyard.

The vessels building here are now being pushed forward as rapidly as possible and at the time of writing the *Illustrious* is almost, if not quite, ready to undergo her steam and gunnery trials. Her completion was somewhat retarded by the fact of the *Victorious* and *Minerva* having to be completed for sea for the recent mobilisation and indeed for a good many weeks, but little was done to her. There was also some delay in the delivery of her armour plates and gun mountings, but all this has now been set right. Her barbette armour is now in place and all her guns on board, as well as her hydraulic machinery. Her interior fittings are practically finished, as are her other fittings, including the installation of the electric light. She has been in hand since March, 1895, and has thus taken over two and a quarter years to complete. The *Goliath* is also in an advanced stage. As an illustration of the eagerness which is now being displayed to get her forward it is noteworthy that some 600 hands were put on overtime on her awhile ago. It is hoped that she will be ready for launching in October and the ways are already being prepared for this event. The *Minerva*, *Endymion* and *Theseus* are now here for refit, and in consequence of the sickness on board the latter vessel she will need to be thoroughly disinfected. Her company suffered somewhat severely from malarial fever contracted during the recent Benin Expedition, and she was ordered to go out of commision immediately after the Naval Review.

The Speed of the "Turbinia."

That speedy little boat the *Turbinia*, the credit of the invention of which is due to the Hon. C. A. Parsons, and to which we referred in our last number, appears to have attracted the attention of the Navy Departments of half Europe. Many writers have expressed the opinion that, in a sense, she has rendered the great fleet which has just been dispersed obsolete, and that it will not be a great while before the piston-rod and cylinder engine becomes a thing of the past. This is, perhaps, going ahead a little too fast, but the boat has undoubtedly been the cynosure of all eyes since she fled down the lines at the Review at great speed, a speed which, according to the imaginative powers of the reporters, has been put down at from twenty to nearly forty knots. We believe that she was not officially present at the Review, as was stated by some journals, but that she was observed cruising about on the outskirts of the great city of ships and was asked to steam down the lines as she did for the benefit of some distinguished visitors on board the *Renown*. She is a very small vessel with a low brick-red hull and a huge funnel painted yellow. When she is going at full speed her bow rises high out of the water and her stern almost trails through it. Thus before the water-tube boiler has been fully developed a rival has sprung up which threatens to render it obsolete, and create a world-wide revolution in marine engineering.

Sheerness Dockyard.

The vessels attached to this place which took part in th Naval Manœuvres have now returned here and the yard has once more resumed its normal aspect. In consequence of the attention which it was necessary to concentrate on the mobilised vessels, work on the *Pomone* had got behind somewhat but now this sister ship to the *Pelorus* may be expected to take the water in November. The *Perseus* and *Prometheus*, now in course of construction at Earle's Shipbuilding Co., will also be sent here to be finished off. The engines of the *Pomone* are to be supplied by Messrs. John Penn & Sons, of Greenwich. Two new sloops will shortly be laid down here, for use when completed, on the Pacific and Australian stations. Their dimensions will be :—Displacement 960 tons, length 180 ft., and breadth 32 ft. 6 in., and a mean load draught of 11 ft. 6 in. They are to have a speed of over 13 knots and are to be fitted with engines of 1,400 H.P., forced draught, and 1,100 H.P. natural draught, with a speed of just over 12 knots. They are to be armed with six 4-in. and four 3-pounder quick firers. One of the sloops will be

engined by contract but the machinery for the other will be made in this yard. The refit of the *Hotspur* is now nearing the final stage. She has been in hand now nearly four months and the alterations and repairs to her have been on a somewhat extensive scale. Her armaments have been considerably strengthened although she still retains her old turret muzzle-loaders. She has now six 12-pounder quick-firers, two 6-in. converted quick-firing guns, and six 3-pounder quick-firers. Her final destination is the Bermudas, there to act as guardship. As soon as the *Proserpine* has her machinery fitted, her completion for the pennant will be rapidly pushed forward. Owing to her engines and boilers not being ready little work has been done on her for the past ten weeks. The whole of the torpedo tubes for the *Proserpine* class of cruisers are being manufactured here.

The Progress of Engineering.

It will no doubt be some time yet awhile before we hear the last of the great Review. The daily press is still very full of it, giving us the opinions of the well-known foreign naval men, and quotations from the journals of almost every nation under the sun, good, bad, and indifferent, and the weekly and monthly magazines contain articles upon the Review from every possible standpoint, nearly all of which contain comparisons with the fleet of 1837 and the 160 odd vessels at Spithead. We notice in one of the fortnightly magazines, that excellent publication the *Navy and Army Illustrated*, that among several articles from the pens of such well-known naval writers as Lord Charles Beresford, Capt. Eardley Wilmot, Capt. Garbett, etc., is one by "A Fleet Engineer, R.N." In it he deals with the progress and improvement made in marine engineering during the last 60 years, and in fact before that. The earliest steam vessels in the history of the Reign of Her Majesty are dealt with, reference being made to the first screw steam vessel which the Admiralty laid down. It then goes on to the introduction of tubular boilers, higher steam pressures and compound engines, the development of screw propulsion, the change in the type of engines, the advent of forced draught and adoption of water-tube boilers, and, lastly, a general reference to the development of steam machinery during the years of Her Majesty's reign. It concludes by saying that nowhere have the advantages resulting from the marvellous changes due to the birth and development of steam engineering been more marked than in the vessels of the British Navy.

Pembroke Dockyard.

Attention at this yard is now being directed chiefly to pushing forward the *Hannibal*, but the *Spartiate* and *Andromeda* are also making fair progress. It is as yet unknown when the first-named ship will depart, but most probably she will remain until September. Large numbers of workmen of all classes have been transferred to her from the *Spartiate* and *Andromeda*, and of course this means that she will progress much more rapidly than hitherto. Nearly all the ship fittings required here are now supplied from outside by contract, instead of the dockyard workmen making them as formerly. Watertight doors, scuttles, valves, and almost every kind of casting are imported, and the men have only to fit them in place. The weight of material built into the *Spartiate* increases at a fair rate. Over 800 tons must have been worked into the hull by now, and as she has now been under construction for about fourteen weeks, a weekly average of 60 tons or thereabouts is not so bad. Work on the new jetty is proceeding as expeditiously as possible, and in order that the materials shall be delivered quickly a temporary railway is being constructed.

The Speed of our Destroyers.

The superiority of the water-tube boilers over those of the old pattern was demonstrated in the speed contest which Captain Jackson, who was in charge of the recent exercises, indulged the torpedo-boat destroyers under his command in. The boats started from Falmouth, and the ensuing race lasted for over an hour, the result being a victory for the *Quail* and *Decoy* in their respective classes. Theoretically the speed of the *Quail* is 30 knots, and that of the *Decoy* 27 knots, the former being built by Messrs. Laird Bros., and fitted with Normand boilers, and the latter by Messrs. Thornycroft, fitted with their own patent water-tube boilers. The result showed of course that the 30-knot boat is decidedly superior to the 27-knot boat, but not in such a marked degree as might have been expected. The *Havock*, which is not fitted with water-tube boilers, was not able to keep up with the other boats when going at a speed of 18 knots." Of the other 30-knot boat the *Sparrowhawk* was second, the *Virago* third, and the *Thrasher* fourth.

THE "OTTO" OIL ENGINE.

WE illustrate in the adjoining diagrams the side perspective elevation of the marine type of "Otto" oil engine with propelling gear. The main object in the design of this machinery has been, we understand, to make the engine and gear in such a way as to allow of its being fixed in vessels very readily, even in out of the way parts where no skilled labcur is obtainable.

To carry this into effect the engine, complete with

all its accessories, with thrust block, reversing gear, etc., is erected complete on a channel iron foundation, which is arranged to be bolted direct to the ship's frames, and which when done the only other connections required are the cooling water pipe to the sea-cock, and the exhaust pipe to the stern.

The regulation of speed and direction of motion of the boat are obtained with a propeller having reversing blades. The boss of the propeller and the internal gear are of gun-metal, the blades being a specially malleable metal having the same strength as soft steel. A friction clutch is provided to enable the boat to be stopped in a short space of time if necessary.

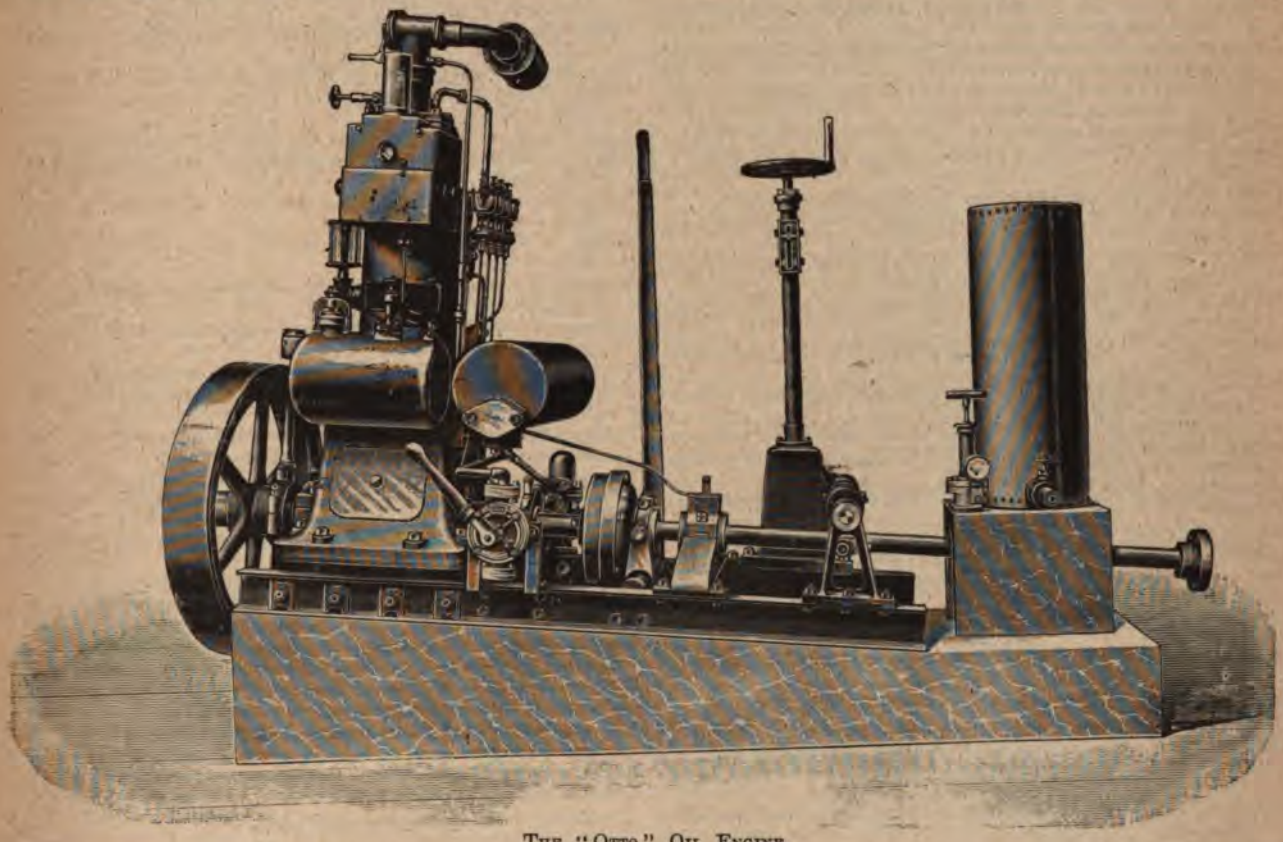
All the working parts are lubricated from one point within sight and easy reach of the steersmen. The

objection of the smell of the exhaust, so common in oil engines, has been overcome, it is claimed, by the use of a condenser of novel design.

The charge of vapour in the cylinder is ignited by an incandescent tube, heated by means of a petroleum lamp. This lamp, which we understand is the result of many years of constant experiments and careful study, is arranged to have the oil forced in under pressure, and burns without soot or smoke with absolute safety.

The engine is fitted with a patent diaphragm valve motion, by which the starting is easily and quickly started by simply giving the fly-wheel half a turn forward and then a jerk backward.

In the larger engines a patent self-starter is fitted.



The "Otto" Oil Engine.

The cooling water is forced through the cylinder liner by means of a plunger pump, driven by the engine itself, a filter being placed in the piping between the sea-cock and pump.

These engines are being manufactured by Julius G. Neville & Co., engineers, of Water Street, Liverpool.

Lean's Royal Navy List.—We have received a copy of this most useful and interesting book for the July quarter. The work is styled the Jubilee Commemoration Edition, and gives a complete encyclopædia of our first line of defence as it is organized at the time of the national celebration. In the preface the editor draws attention specially to the records of the war and meritorious services of the officers of the Royal Navy (only to be found in this work), and of the Royal Marines and Royal Naval Reserve, and to the fact that it deals with the career of some 10,000 Naval officers.

Business Announcement.—We are advised that Messrs. Wilcox Bros., consulting engineers, 68, John Street, Sunderland, have been appointed by the Phosphor Bronze Co., Limited, as the company's representatives in the districts of the Tyne and Wear, Messrs. Wilcox Bros. have also, we are informed, been appointed the representatives for the North-East Coast, of Messrs. H. P. Parkes & Co., of the Tipton Green Chain and Anchor Works, Staffordshire. Messrs. Wilcox, it may be stated, are the patentees of the propeller which bears their name, and are well-known in shipping circles at the North-Eastern and other ports of the kingdom.

"White Japan."—Messrs. R. T. Atkins & Co., varnish and colour manufacturers, of 55, Wych Street, Strand, have introduced a new enamel paint, which they have named "White Japan," and which possesses several qualities that make it peculiarly suited to the decoration of ships' cabins, saloons, &c The principal features are:—brilliance and durability of gloss; absolute purity of whiteness; non-liability to chipping, or changing of colour; and imperviousness to the effects of heat or sea water, and sea air. It is singularly easy of application and has no tendency to "drag," as is the case with many so called "enamels." No brush marks are left, and a perfectly smooth surface is thus secured. Mr. Thos. Beynon, of No. 9, Dean Street, Newcastle-on-Tyne, has been appointed the northern agent for the sale of this interesting speciality.

The Civil and Mechanical Engineers' Society.—H.R.H. the Prince of Wales received on Wednesday, July 21st, on behalf of Her Majesty the Queen, at St. James's Palace, a deputation from the Civil and Mechanical Engineers Society (11, Victoria Street, Westminster), consisting of the President, Mr. S. A. Court, A.M.I.C.E., Vice-President, Mr. B. Baines Dadley, A.M.I.C.E., and the following members of the Council—Messrs. W. Cooper Penn, A.M.I.M.E., H. V. F. Valpy, M.I.C.E., E. H. G. Brewster, A.M.I.C.E., and Mr. Percy Field, for the purpose of presenting an address of congratulation to Her Majesty on her long and prosperous reign. The society were afterwards invited to the opening ceremony of the National Gallery of British Art, Grosvenor Road.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from June 25th to July 23rd, 1897 :—

Adams, W. H., chief engineer to the *Andromache*, to date July 19th.
Agnew, Thomas, fleet engineer to the *Nile*, to date July 19th.
Austen, E. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Bath, Frederick, assistant engineer to the *Alarm*, undated.
Bearblock, Charles W. J., engineer to the *Express*, to date July 19th.
Bolton, Arthur W., engineer to the *Mohawk*, to date August 21st.
Carnt, E. C., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Carruthers, David J., engineer to the *Vivid*, additional, undated.
Cleave, Thomas W., assistant engineer to the *Galatea*, to date July 21st.
Coleman, Arthur W. (probationary), assistant engineer to the *Victory*, to date July 1st.
David, Thomas M. (probationary), assistant engineer to the *Camperdown*, to date July 19th.
Davis, Thomas G. R. (probationary), assistant engineer to the *Prince George*, to date July 19th.
Dawe, Charles, fleet engineer to the *Vivid*, to date July 17th.
Donkin, C. F. L., assistant engineer to the *Alexandra*, to date July 19th.
Drake, Sidney J., engineer to the *Locust*, to date July 19th.
Drought, Arthur E., assistant engineer to the *Niger*, to date July 19th.
Ellis, M. W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Faulds, Arthur G. J., acting chief engineer to the *Scout*, to date July 19th.
Fawckner, S. M. O., assistant engineer to the *Victory*, to date July 19th.
ielder, J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Frowd, William S., engineer to the *Victory*, additional, undated.
Fussell, John S., staff engineer to the *Collingwood*, to date July 17th.
Gale, William H. C., fleet engineer to the *Amphion*, to date July 3rd.
Gaudin, E., chief engineer to the *Albatross*, to date May 18th.
Glanville, William G., engineer to the *Wolf*, to date July 19th.
Graham, James E. D., staff engineer to the *Pique*, to date July 19th.
Haddy, George A., fleet engineer to the *Rupert*, to date July 17th.
Haigh, Francis E. P., assistant engineer to the *Spanker*, to date July 21st.
Hamm, Richard S., fleet engineer to the *Invincible*, to date July 17th.
Hardcastle, C. V., engineer to the *Daphne*, to date July 19th.
Haste, F. C., assistant engineer to the *Gleaner*, to date July 21st.
Hastings, James F. A., engineer to Hong-kong yard, to date July 5th.
Hefford, Edward O., engineer to the *Charybdis*.
Heyes, Henry W., acting engineer to the *Hermione*, to date July 19th.
Hobbs, Lionel M (probationary), assistant engineer to the *Victory*, to date July 1st.
James, C. J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Jenkin, John H., engineer to the *Assaye*, to date July 19th.
Johnson, J. E., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Jordan, Charles F., engineer to Hong-kong Yard, to date July 5th.
Juniper, William V., chief engineer to the *Pomone*, undated.
Kerr, John, staff engineer to Hong-kong yard, to date July 5th.
Kestell, E. R., assistant engineer to the *Arrogant*, to date July 19th.
Lister, F. H., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Ludgate, W. G., engineer to the *Seagull*, to date July 19th.
Lonnon, William, staff engineer to the *Triumph*, to date July 19th.
Mallinson, Ernest D., engineer to the *Wildfire*, to date July 19th.
Meaden, Nicholas, fleet engineer to Chatham Dockyard, undated.
Morcom, William C., engineer to the *Contest*, to date July 19th.
Morris, Thomas C., engineer to the *Seal*, to date July 19th.
Moysey, Alfred H., engineer to the *Swordfish*, to date July 19th.
Noll, George W., chief engineer to the *Sheldrake*, undated.
O'Dogherty, Francis B. (probationary), assistant engineer to the *Hawke*, to date July 19th.
Oram, H. J., inspector of machinery to the *President*, for service at the Admiralty as senior engineer inspector, to date May 18th.
Parsons, George, fleet engineer to the *Theseus*, additional, to date July 19th.
Pattison, A. R., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Pellow, Charles H., fleet engineer to the *Vivid*, to date July 17th.
Perkins, George L. R., chief engineer to the *Pembroke*, additional, to date July 19th.
Prinp, Frederick, assistant engineer to the *Colossus*, to date July 19th.
Reed, A. T. P., engineer to Hong-kong yard, to date July 5th.
Roffey, James R., engineer to the *Victory*, additional, to date July 17th.
Roger, Cuthbert R., engineer to the *Renard*, to date July 19th.
Rosevere, Edward J., assistant engineer to the *Vivid*, to date July 19th.
Rule, Thomas, fleet engineer to the *Vivid*, additional, to date July 18th.
Salter, A. G. V., assistant engineer to the *Grafton*, to date July 19th.
Spalding, A., fleet engineer to the *Wildfire*, additional, to date July 19th.
Steward, C. H., staff engineer to the *Pembroke*, additional, to date July 19th.
Stuart, James J., staff engineer to the *Endymion*, undated.
Stuart, Marlin, chief engineer to the *Vivid*, additional, to date July 21st.
Thomas, E., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Thomsett, Frank D., engineer to the *Alarm*, undated.
Thumwood, L. E., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Thumwood, L. E., chief engineer to the *Mohawk*, to date July 21st.
Toop, Henry, engineer to the *Panther*, to date July 19th.
Veen, Vernon A. Ter, assistant engineer to the *Cossack*, to date July 19th.
Vining, Henry P., chief engineer to the *Rainbow*, to date July 19th.
Watch, Harold V. H. (probationary), assistant engineer to the *Cambrian*, to date July 19th.
Wilson, John D., engineer to the *Victory*, additional, to date July 17th.
Winney, Henry T., engineer to the *Royalist*, to date July 19th.
Yeats, Henry T., engineer to the *Cygnet*, to date July 20th.

HOAR & BROWN'S HALF-YEARLY HARDWOOD MARKET REPORT, JULY 12th, 1897.

TEAK.—The following statistics relate to the first six months of the last three years —

	1895.			1896.			1897.	
	Timber. Loads.	Planks. Loads.		Timber. Loads.	Planks. Loads.		Timber. Loads.	Planks. Loads.
Landings	6,585	2,492	..	7,467	1,968	..	5,394	2,429
Deliveries	5,972	1,625	..	8,468	2,208	..	6,699	2,535
Stock.....	5,079	2,619	..	6,309	2,517	..	9,362	2,042

The stock on 30th June consisted of 11,428 loads, which is practically the same as that on 31st December last. Although this is so, the wood is not of the same character, as these figures include a large proportion of inferior timber. These inferior shipments found buyers during the earlier part of the year, but later on sales became difficult as stocks increased, and there are several parcels of this class of timber now lying here unsold, which when realised must result in serious loss to the shippers. The stock of first-class timber is comparatively small, and in consequence prices now ruling are very firm.

The English Admiralty have been the largest consumers, and although the rolling-stock manufacturers have been fairly busy they have, in consequence of high prices, restricted their purchases to actual requirements. The volume of business in floating cargoes has been very considerable, and the tonnage of vessels from Bangkok especially being small, buyers have been able to satisfy their requirements by these direct shipments, instead of having recourse, as usual, to landed stocks. The tonnage afloat at the present time is extremely small, most of the cargoes now on the way being already sold.

The only point of weakness in the market at the present moment is the lack of enquiry, and for this reason we do not see that prices are likely to be advanced. However, on the other hand, in the face of the small stock available, present quotations are sure to be maintained for some considerable time.

Business in planks has been very brisk all through the half-year, and prices have advanced fully 30s. per load since 1st January. Shippers are holding very firmly at these advanced figures. Sales of parcels are somewhat difficult to negotiate, but trade in small quantities is fairly active.

MAHOGANY.—The landings and deliveries for the past six months are as follows :—

	Landings.		Deliveries.	
	1896.	1897.	1896.	1897.
	Logs.	Logs.	Logs.	Logs.
Honduras	3,082 ...	6,438 ...	3,783 ...	6,257
Nicaragua ...	Not recorded.	1,661	Not recorded.	1,145
Tobasco & Mexican..	2,900 ...	5,335 ...	3,220 ...	4,811
St. Domingo	703 ...	709 ...	1,467 ...	1,138
Cuba	3,990 ...	2,640 ...	7,263 ...	3,336
Panama	486 ..	448 ...	552 ...	567
African	462 ...	1,270 ...	631 ...	1,030

The imports during the six months show a very considerable increase on the same period last year, when the supply was unusually small. There has been a brisk demand for good wood, and prices have been and are still very firm for this class of timber. The commoner qualities, of which there is a very large stock, show a falling-off in value.

At the present moment there are very few enquiries, but the healthy condition of the trade is shown by the increased consumption. There is no doubt that but for the large importations of Nicaraguan and African wood, prices for Honduras and Tobasco would have been very high.

CUBA is selling readily at high figures. Importations have been limited to small parcels forwarded from the Continent and from America.

CEDAR.—An active demand has prevailed for the better class logs at good prices, but the large importation of Paraguay tended to depress the value of the common wood used for box-making. The stock of this class of timber is now very heavy, and as it is not generally enquired for, prices will have to be reduced in order to stimulate consumption.

AMERICAN WALNUT.—The stock of logs is moderate and the quality generally inferior. Full prices rule for prime large logs, but inferior sorts are very slow of sale. The same remarks apply to planks and boards.

SEQUOIA.—The imports have been beyond the requirements of the market, and prices at the present moment show a considerable reduction on those quoted at the commencement of the year.

KAWRIE PINE—PLANKS.—A fair amount of business has been done, and this wood seems to be growing in favour with those who have used it largely. Stocks are light and prices firm.

The general course of business during the half-year was very satisfactory, the demand during the first four months being decidedly active, but there was a falling-off in May and June which may be attributed to the Whitsuntide holidays, also to the anticipated disturbances in the shipbuilding and engineering industries, which have probably caused contractors to withhold purchasing until it becomes absolutely necessary.

Marine Boiler Management and Construction. By C. E. Stromerger. In consequence of the recently published alterations and amendments of Lloyd's Register Boiler Rule, certain alterations should be made in the text of the above work. These alterations have been embodied in a supplement, copies of which can be had on application, enclosing a stamped envelope, to the publishers, Messrs. Longmans & Co., 39, Paternoster Row, London, E.C.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE flourishing condition of the engineering trades has been brought to a standstill, a labour war of serious dimensions taking place during the present month, in consequence of the London engineers going out on strike for a 48 hours' week. The Employers' Federation, seeing that it would mean more "overtime" and extra pay, issued lock-out notices to all their members. These were received by the Clyde employers, in common with those of other centres, on Monday July 5th, and in most cases were posted on the gates of the works before stopping time on Tuesday night. The Amalgamated Society of Engineers threatened that on the first 25 per cent. of the men being dismissed the remaining 75 per cent. would immediately come out on strike, something like 9,000, it is estimated, being thrown idle. The fair holidays commencing on Friday afternoon, July 16th, the engineers in Glasgow had the advantage over their fellows in the lower reaches, and for that part over all those in other districts, as they received 15s. per week strike pay, when, had there been no trouble, they would have been earning nothing. The loss to them during the first two weeks is, therefore, not so serious as to the others. Of the employers who have not as yet issued lock-out notices are Messrs. The Fairfield Shipbuilding and Engineering Co., Limited, the men being confident that the company has absolutely severed its connection with the Employers' Federation. Sir William Arrol, one of the directors of the Fairfield Co. has resigned because he disapproves the decision of the Board to hold aloof from the Federation. The Amalgamated Society of Engineers have secured the same halls which were used in the Glasgow district in connection with the last strike, and the "vacant books" of about a dozen branches have been removed from the Trongate offices to these halls. In Govan the men will meet day by day in the Robert Street Hall, and in the Finneston district the centre will be the Liberal Association Rooms, Dumbarton Road. Committees have been appointed to attend to the affairs of the various branches. The Glasgow district sub-committee will control the details of the work in the upper reaches. Strike money has been paid to the engineers at the rate of 15s. per week, with 6d. per week for each child under fourteen years of age, while the non-unionists are given 10s. per week. Although the men say that this strike has been forced upon them, it is a known fact that their leaders have been preparing for it for months, being another way of demanding higher wages. So far, the position remains one of firmness on both sides.

We understand that plans have been prepared for the construction of a tidal slip and graving dock on the Clyde at Elderslie, and that the Clyde Trustees have given a certain amount of approval to the proposal. The undertaking is in the hands of private parties, and that has given rise to considerable comment after the recent declaration by the trustees that such works should be under their direct control.

Messrs. Hawthorn & Co., Leith, have received an order to build a steel screw steam yacht of 350 tons for Captain Arthur Wiggins. She will be constructed to the highest class, and under the supervision of Mr. A. H. Brown, naval architect, London.

Messrs. The Fairfield Shipbuilding and Engineering Co., Limited, have contracted to build a first-class passenger steamer about 500 ft. in length, by 60 ft. in breadth, and of 8,000 tons, with engines of 10,000 H.P., capable of giving a speed of 16½ knots, for the Orient Steam Navigation Co., Limited. The new liner will be used on the Australian mail service.

Messrs. Chas. Connell & Co., Scotstoun, have received an order to build a large cargo steamer.

Messrs. Russell & Co., Port-Glasgow, have contracted with Messrs. Wm. Thomson & Co., St John's, New Brunswick, to build four steel steamers, of 4,000 tons carrying capacity each. The engines will be triple-expansion, two sets to be constructed in Glasgow and two in Greenock. The new steamers will form a line between New Brunswick and Liverpool. Messrs. Russell & Co. have also received an order from the King Line, Limited, of Glasgow and London, for a steamer to carry about 5,200 tons on an exceptionally light draught of water.

Messrs. the Caledon Shipbuilding and Engineering Co., Limited, Dundee, have received an order to build a high-class steamer of about 600 tons for Messrs. M. Langlands & Sons' line. She is to be built to the highest class of the British Corporation Registry, and is to have a speed of 13 knots.

Messrs. Mackie & Thomson, Govan, have received orders to build 20 steel steam trawlers, each of about 170 tons.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—The monthly report of the Boilermaker's and Iron Shipbuilder's Society for July, says that "shipbuilders continue to keep quietly booking orders—equal in extent to the tonnage launched—and that, consequently the outlook for the future is as satisfactory as could be wished." We refer to this, because the statement is largely quoted in the daily and weekly press, and conveying as it does an exaggerated idea of prosperity in the industry is likely to have injurious consequences. We do not profess to be so deeply in the confidence of the shipbuilders as to be able to state with absolute exactness the condition of their order books; but, judging from the standpoint of the ordinary observer, we think we are safe in saying that the statement, though probably not without a substratum of truth, is very far indeed from giving a correct view of the situation. If shipbuilders were booking orders, as stated, it is scarcely likely they would make confidants of trade union officials—the very persons who would found upon the information an excuse for formulating some new demands in the supposed interest of labour. Apart from this view of the matter, however, there is the undoubted fact that freights are too low to be remunerative, and that consequently there is no real inducement for shipowners to invest in new tonnage excepting in such as may be required for special and exceptional purposes.

The advances of wages which were accorded some months ago, and the subsequent advances in the prices of material, have made it incumbent upon builders to raise their quotations—a circumstance which, it may be assumed, has further tended to restrict speculation. Along with this, however, is to be taken into account the spirit of unrest that has existed for some time past in various ranks of labour—a thing in itself sufficient to keep in check the exuberant enthusiasm of even the most successful "promoters." Very few orders indeed, have been placed during the month, and enquiries for new tonnage have become comparatively scarce. This was the answer that was given quite recently to a question addressed to a gentleman occupying a prominent position in connection with North-East coast shipbuilding, and a statement of this kind from such a source is, we are sure, more to be relied upon than the most positive assurances from ill-informed trade union officials.

It is understood that the scheme for creating a new Canadian line of mail steamers to run between this country and Canada, is now definitely settled. Messrs. Peterson & Tate, of Newcastle, being the holders of the contract. It is expected that one or more of the vessels required for the service will be ordered from Tyne builders. They will be of immense size, great speed, and most elaborate equipment, and it is not too much to say, will far surpass anything hitherto done in the way of mail-boat building on the North-East coast.

Orders placed last year, or early in the present year, are still keeping several of the principal yards busy, the Elswick establishment of Messrs. Armstrong, Whitworth & Co. continuing to hold the lead in this respect. The method of payment for labour in the plating department at this yard, is different to that employed at other establishments, and is, we understand, satisfactory to both employer and employed. Instead of being paid by results, as at other places, the Elswick platers are "allowed" a sum per day considerably in excess of current time rates, and although they are not expected to use piecework pressure in carrying out jobs to completion, they are under a sort of obligation to execute each day an amount of work which, in the eyes of experts, will be fairly commensurate with the pay they receive. The Low Walker yard of this eminent firm has been the scene of another vexatious strike lately, the offenders this time being the youths who are usually engaged in heating rivets for the riveters. These representatives of the "new school" held the opinion that the management should not take on apprentices without their sanction, and went on strike to enforce that singular view. It is to be hoped that this foolish escapade will not have caused any serious hindrance to business, and that steps may be taken to restrain individuals from indulging in the luxury of a strike until they have, at all events, attained years of discretion.

A high state of activity is still to be noted at Messrs. C. S. Swan & Hunter's and Messrs. Richardson's yards, the berths in both cases being fully occupied. At the former establishment a fire broke out recently, but was soon extinguished by means of the firm's own appliances, which are always kept in readiness. If the firm had to depend upon the aid obtainable from other places, much injury might have been done; but thanks to the effective arrangements on the spot which were brought into use without loss of time, the fire was got under with comparatively little damage to property, and long before the fire-engine, which had been telegraphed for to Newcastle, had arrived.

The Palmer Co. have a good show of work on the stocks of their Jarrow yard, but have not increased their contract engagements lately. The fitting out of vessels in the water—both warships and merchant ships—is engaging the services of a large number of men.

The Tyne Shipbuilding Co.'s yard maintains the appearance of activity which has characterised it for some time past, but at one or two other yards in the neighbourhood a good many empty berths are to been seen. From the yard of Messrs. John Readhead & Sons there was launched, on July 19th, a vessel of fine proportions, ordered by James Knott, Esq., for addition to the "Prince" line of steamers. The keel for another vessel has since been placed in the vacated berth.

Engineering.—The whole of the engineering establishments on the Tyne are now partially idle owing to the strike of the engineers in reference to the eight hours' day question. In every case, the foremen, the apprentices, and a number of non-union workmen remain at work, and it is highly probable that in the course of a week or two the number of the latter will be largely augmented. Both the parties to this dispute are full of determination, and there is little reason to doubt that the struggle for victory will be long and bitter. Some outsiders who do not seem to understand the great issues at stake are already hinting at the desirability of holding a conference, at which a kind of "split the difference" settlement might be arrived at with the result of bringing both parties into a mutually admiring and amiable frame of mind. All hints and suggestions of this kind are out of place on the present occasion; for the employers have their backs to the wall and cannot recede one step from the position they have taken up, which is one of uncompromising hostility to any reduction of the present hours of labour, and while the first flush of strike fever is on them the men will not abate one jot of their demand.

It is indeed a case of war to the death, and only the absolute and unconditional surrender of one side or the other can bring it to an end. Which side is this to be? Well, seeing that both parties are equally gifted with that dogged dislike to "giving in," which has done so much for England in the past, it appears to us that victory must rest with the side which can hold out the longest. In a struggle of this kind, where nothing in the way of compromise is possible, capital is bound to get the better of labour, and nothing will prevent that termination in this case, unless very serious defections take place in the ranks of the employers. This is not the place to discuss the justice or expediency of an eight-hour working day; but we may observe in passing that the same arguments that are used in advocacy of the eight-hour day might be employed with equal effect in favour of a six-hour or a four-hour day.

The principle of limiting adult labour to any specified term is, in fact, indefensible, since every man should be permitted to work as many hours per day or per week as he pleases. In our present form of society, labour can only be dealt with as a thing to be bought and sold, and there is quite enough room for haggling in respect of the price of it without bringing in as a controversial subject the quantity to be sold. Before leaving this subject, we feel bound to address a word of remonstrance to those men in authority among the workers, who have lately developed a habit of describing the employers as the bitterest foes of labour. This kind of talk is worse than childish; for it is untruthful and it is mischievous. The men who, in the Press, stigmatise certain employers as "pseudo-Napoleons," will address those gentlemen in different language at the Conference board, and such changes of tactics are undignified. There is no need to make the gulf between capital and labour wider than it is, and they who do so by a resort to unnecessarily harsh language are, in reality, no friends of either. The employers and the workmen are really partners in an undertaking upon which the prosperity of both depends, and though a temporary misunderstanding may arise between them, they cannot afford to be enemies, and must eventually agree to resume the journey of life under the old relationship.

The Ordnance Works at Elswick continue very busy, and as nearly all the non-unionists remain at work, the productiveness of the department is but very slightly affected by the strike.

The Palmer Co., and also the Neptune, Wallsend, Slipway, North Eastern, and St. Peter's Companies are fitting vessels with machinery at their respective establishments by the aid of the foremen, the apprentices, and, in some cases, non-union workmen. The work is being carried out much more slowly than usual; but the employers are very well satisfied to have this essential work in progress, and are not disposed to cavil at such a very natural feature, under the circumstances, as slowness of execution.

Iron foundries are still pretty busy, but though there is a lot of work in hand, a lull must come soon, seeing that castings are not likely to be wanted at the engine works. In the forges business has already undergone a very sensible diminution, a result which is no doubt attributable to the falling off of shipbuilding orders.

Messrs. Noble & Lund, of the Felling machine tool works, have just supplied to a large steel works in Scotland a band saw, the capacity of which has been very effectually tested. The test lay in cutting through a steel ingot weighing 25 tons, and measuring 38 in. each way, and the work was done in less than half the time occupied in cutting through an ingot of this thickness by the ordinary means. This band saw, it may be stated, is the most powerful ever manufactured in this country, and we are not aware that one of equal capacity has been made elsewhere. The firm are now extremely busy in this department, and besides a number of orders from centres in the United Kingdom, have orders for band saws from Japan, Austria, Holland, France, &c. In the piston ring department business is also brisk, there being numerous orders in hand from engine builders on the Tyne, Wear, Tees, Cardiff, and Belfast. The newly-added erecting shop is now in full swing, and the erection of a new foundry building has been commenced.

The Combination Metallic Packing Co., of 11, Lombard Street, Newcastle, are well supplied with orders for their speciality, which is largely used in connection with the machinery of warships, and of high-class steamers generally, and the works at Gateshead continue to be kept in active operation.

THE WEAR.

Shipbuilding.—Messrs. Doxford having launched their second torpedo destroyer, are now busily preparing the ground for the laying down of a large merchant steamer. Rumour credits the firm at present with several orders of very special importance; but though it is pretty well known that the firm are better off than most of their competitors in the matter of orders, it is probable enough that some of the statements made with regard to their contract engagements for the future, may turn out to be unfounded. The other yards above bridge are still quite busy, Sir James Laing having in addition to other work, two large twin-screw Japanese steamers on the stocks.

Among the yards near the mouth of the river, and at the South Dock, the North Sands establishment has by far the largest show of work, the vessels in progress and getting prepared for sea, being no less than seven, having an approximate aggregate carrying capacity of 40,000 tons. The vessels on the stocks are, all but one, in early stages, and unless a stoppage comes through the engineers' strike, there is a prospect of full activity being maintained throughout the year. Messrs. Blumer launched a vessel recently, and another is now being put down in the vacated berth. The firm have a large vessel in the plating stage, and it is stated that an order for another of even larger capacity is on the books.

Messrs. Bartram & Sons are preparing to launch a large vessel to be named the *Kirklee*, and another of equal size is being plated. The Sunderland Shipbuilding Co. are commencing the construction of a large vessel for the meat trade, and at Messrs. Austin & Sons' there are a couple of vessels in early stages on the stocks. There is but a limited amount of repair work in the port at present, and none of the contracts in hand are of exceptional consequence.

Engineering.—The only Wearside marine engineering establishment that is now in full operation (being unaffected by the strike) is the Scotia Works, belonging to Messrs. Wm. Allan & Co. The eight hour day was adopted here some three years ago, and the head of the firm has declared more than once, that its introduction has proved advantageous from the employers' point of view. Though this may be true in substance, it does not follow that the same advantage to employers would follow the adoption of shorter hours in all cases; for on starting the eight hour system at the Scotia Works, the men were, no doubt, from the first actuated by a desire to make the experiment a success which would act as an incentive to others. A very little extra exertion on the part of each workman would accomplish substantial results in the aggregate, and to this is undoubtedly to be attributed such success as may have attended the lessening of hours in this instance. Messrs. Short Brothers, the well-known firm of shipbuilders, have also had the eight hours in practice for some time; but it is not probable that in this case any appreciable advantage or disadvantage has been experienced, as fully nine-tenths of the men are constantly employed on piece.

The Wear Commissioners are evidently determined to enhance as much as possible the reputation of Sunderland as a shipping port, and are now engaged in preparing for the erection of additional coal staiths, at which vessels of the largest class can be loaded at almost any state of the tide. A few years ago the Commissioners made some notable changes in their staiths to keep pace with the growing tendency to employ ships of larger tonnage in the coal trade, and that tendency being still very strongly in evidence, it has become necessary to make the further advance towards increasing accommodation, to which reference is made above. The Commissioners have also commenced the erection of a large building for warehousing general goods, and the great improvements in accommodation that will be afforded will no doubt be appreciated by shippers. The construction of the piers which, when completed, will make Sunderland a veritable harbour of refuge, is being steadily proceeded with, and this great work—which can only be carried on under favourable atmospherical conditions—will probably be completed by midsummer next year.

The Hartlepools.—Messrs. Furness, Withy & Co., who seem to be ever on the alert to seek out new, or enlarged, outlets for their enterprise, are now about to add to their yard a considerable extent of foreshore. This addition, when properly "recovered," will enable the firm to increase the length of their berths, and otherwise extend the area of the yard. The firm are well supplied with orders, a statement which also applies to the other shipbuilding firms at this centre. At the Central Marine Works, there are just now some special engines in progress, for which the condensers have been made at the foundry of Messrs. Wallis Bros., Sunderland. These castings are exceptionally large, weighing over thirteen tons, and are designed on what appears to be a new principle. The new departure in electrical engineering at the works of Messrs. Richardson has aroused much interest in the north, and already promises to be a great success. The Hartlepool Steel Works are kept steadily going, and at the docks business is now very brisk.

Stockton.—Messrs. Ropner & Sons have at present four patent "trunk" steamers on the stocks, and two in the water getting fitted out. It is stated that the firm have other orders in reserve. Messrs. Richardson & Duck have a very large vessel well advanced towards completion, and one or two smaller ones in early stages. At the yard of Messrs. Craig, Taylor & Co. there is a large vessel being plated, and another in the framing stage. Rolling mills are kept busy, and both bridge and boiler works are well supplied with orders.

Middlesbro'.—There continues to be a good show of work at the principal shipbuilding yard, and in the repairing line there is also a fair amount of work going on. Local engine works are pretty busy, except in cases where the strike has been declared. In these instances only the apprentices and non-unionist workmen are employed, in addition to the permanent officials. Steel works are kept actively going, and at the docks a marked improvement in business has taken place lately.

Darlington.—At this centre of forge work and railway work, trade continues brisk, the Darlington Forge Co. having a good many orders for work of a special class.

New Harbour.—The authorities of Gefle, in Sweden, have decided, at a cost of some £55,000, to build a new harbour, and to deepen and improve the access through the "fjord."

The Austrian Lloyd Company have started running as an experiment a line of steamers from Aden to Zanzibar, calling at Mombasa and connecting at Aden with their Trieste-India line.

THE MERSEY.

(From our own Correspondent.)

THE lock-out and strike arising out of the eight hours question has necessarily caused a thorough disorganisation of industrial operations throughout the engineering, shipbuilding, and iron trades of this district. All the leading engineering firms in the Liverpool, Birkenhead, Manchester, Bolton, and some of the neighbouring districts have, with comparatively few exceptions, joined in locking out 25 per cent. of the members of the trades unions concerned in the London movement, and in accordance with resolutions passed by meetings of the workmen's societies, the remaining 75 per cent. of their members have been withdrawn. Such being the case there is necessarily very little to report as regards general business; but it may be noted that the lockout and strike of the trade union members does not as yet mean a complete stoppage of work at the establishments affected, most of them having still sufficient men in their works to carry on some portion of their operations, especially in the finishing of work nearly completed, whilst in the boiler-making and bridge-building works the bulk of the men have not struck. Generally, establishments were exceedingly busy when the strike commenced, a fact which is amply confirmed by the usual monthly employment returns issued by the principal engineering trade unions just before the lock-out notices came into effect, and which show a very low percentage of out-of-work members. The Amalgamated Society of Engineers reports only about 1⅜ per cent. of its total membership, on donation, with only 1¼ per cent. on support in this immediate district. The Steam Engine Makers' Society has 1¼ per cent. on benefit, which is a slight increase, due partly to the holidays, and partly to some slackening off in the cycle industry. The United Machine Workers' Association has only 1 per cent. of its membership on donation. Reports as to the state of trade continued very satisfactory, activity prevailing in practically all important branches, establishments generally having orders in hand which would carry them on for some time to come; but the present dispute, of course, checks the placing of new orders.

As to the extent of the movement in this district, up to the time of writing, it is difficult to obtain definite information, as the whole of the lock-out notices have not yet expired. Practically all the firms in connection with the Employers' Federation, Shipbuilders' Association, and Iron Trades Employers' Association, besides a number of outside firms, have carried out the Manchester resolution, and the employers' officials attach little importance to the rumours of probable defections. In Manchester the list of firms affected includes Sir Wm. Armstrong, Whitworth & Co.; Beyer & Peacock; Brook & Doxey; Pearn & Co; Adams & Co.; Shepherd & Ayrton; Atlas Engineering Co.; Hetherington & Co.; Wren & Hopkinson; Joseph Stubbs; W. H. Bailey & Co.; Smith & Coventry; Hulse & Co.; Isaac Storey; Kendall & Gent; Muirs; De Bergue & Co.; Edmiston; Birch & Co.; West's Gas Improvement Co.; Ferranti & Co.; Richmond & Chandler; P. R. Jackson & Co.; Browett & Lindley; Nasmyth, Wilson & Co.; Luke & Spencer. About 2,000 members of the Amalgamated Society of Engineers are affected, 470 of the Machine Workers' Association, and a few hundred members of the Steam Engine Makers' Society. The Oldham masters are undecided, but at Bolton all the large firms are locking out. Liverpool is also largely affected, and at Birkenhead the trade union men employed at Messrs. Laird's ceased work on the 10th inst. The strike at their works will affect about 2,000 hands, or even more, and will necessarily delay the work the firm had in hand, including H.M.S. *Glory*, torpedo boat destroyers, an Irish mail boat, and other vessels. The following firms in Liverpool have also locked out:—W. W. Potter & Son, John Jones & Sons, and Ellis Marsden. Both the employers and the workmen maintain a very firm attitude. The employers consider the present dispute not only as a fight on the eight hours' question, but as a movement on their part to resist trade union dictation, and they are making efforts with considerable success to extend the lock-out amongst employers who are not federated. The trades union officials, on the other hand, regard it as unjustifiable that the employers should lock out provincial workmen on a question affecting London alone, and think that they are being victimised in a most cruel manner. In any event the struggle, if long protracted, will have an injurious effect upon the engineering trades of the large northern centres, and it is to be hoped that before long the respective parties to the dispute will endeavour to bring about some amicable arrangement for a settlement.

On the 15th July Messrs. Laird Bros. had a successful trial of H.M.S. *Panther*, on the Skelmorlie mile, when 30·52 knots was obtained as the mean of six runs, and 30·16 for three hours' continuous steaming.

Messrs. David Reid & Co., Oldham Street, Manchester, manufacturers of Manchester pattern pulley blocks, well pulleys, &c., have brought out a number of improved patterns, both as regards strength and quality. In the Manchester pattern blocks they make special sizes for small guy ropes, rigging, cart sheets, &c., and larger sizes for ships' purposes and engineers' requirements. In their well pulleys they have a number of special patterns suitable for shipping and dockyard requirements, and boating and yachting purposes. One of these is an extra strong cargo gin, for cargo litting, and suitable for exceptionally rough and heavy work. They also make common well pulleys not turned, but strongly made, and adapted to meet cheap markets. These pulleys are specially suitable for export, colonial, and plantation requirements. Another design is a Para pattern well pulley, with all parts galvanized, and wrought-iron hooks and frames. This pulley is useful for light lifts for colonial and plantation requirements. The firm supply a good many of these pulleys for shipment abroad. Messrs. Reid are also make hoisting crabs, chains, &c., for various purposes. They have, it may be added, recently extended their works capacity.

Messrs. Giddings & Dacre have recently opened new premises in Chapel Street, Salford, Manchester. These include commodious works, stock-rooms, show-rooms, and offices. Amongst their specialities is a machine varnish suitable for all kinds of machines and brass work. This varnish is perfectly clear, and it is claimed that a machine to which it is applied will keep its brilliant surface much longer than with ordinary varnish. It is manufactured by a special method of mixing, and has been adopted by many of the leading engineering firms, and other establishments where machines are used, with very satisfactory results. The varnish is made at the special paint and colour department of the firm's works.

The dispute in the engineering trade has necessarily a depressing effect upon the iron market here, and produces an unsettled outlook as to the future. Consumers both of raw and manufactured material are holding back from buying, and although makers' prices are without material change, there is so little actual business stirring that these are only nominal. Local makers still quote about 46s. 6d. for forge to 48s. 6d. for foundry, less 2½; Lincolnshire makers have reduced their list rates 1s. per ton, and now quote 42s. 6d. for forge to 44s. 6d. for foundry, with Derbyshire foundry remaining at 47s. to 47s. 6d., less 2½ delivered Manchester, with, however, nothing doing to really test prices. Outside brands have shown an easing down in the open market, and ordinary G.M.B. Middlesbrough can now be bought at about 48s. to 48s. 3d. net cash delivered by rail Manchester, although makers still ask 1s. to 1s. 6d. above these figures. With regard to Scotch iron, Eglinton and Glengarnock is now readily obtainable at 46s. 6d. net prompt cash delivered Lancashire ports, and 48s. 9d. Manchester docks, whilst American pig-iron has been sold at about 46s. 6d. to 47s. at the docks.

In finished iron business shows a decided slackening off, with a weak tone in prices, although makers are still quoting late rates. Lancashire bars average £5 15s. to £5 17s. 6d., and North Staffordshire qualities £5 17s. 6d. to £6 2s. 6d. delivered Manchester district. Sheets can now be bought at £6 17s. 6d. to £7. Hoops remain at the association list rates of £6 10s. for random to £6 15s. for special cut lengths delivered Manchester district, and 2s. 6d. less for shipment.

A weaker tone prevails in the steel trade, so far as raw material is concerned, but some classes of manufactured material maintain a fairly steady tone, the dispute in the engineering industry only very partially affecting firms engaged in boiler-making and bridge-building. Ordinary foundry hematites are obtainable at about 6d. below last month's rates, and average about 57s. to 57s. 6d., less 2½, with local steel billets bought at £4 7s. 6d to £4 10s. net cash. Steel bars, however, are firm at £6 3s. 6d. to £6 5s., and boiler plates £6 5s. to £6 7s. 6d., delivered Manchester district.

In the metal market the engineering trade dispute has caused an almost complete suspension of enquiry for manufactured goods, but quoted list rates remain as under:—Solid drawn brass tubes, 7¼d.; solid drawn brass surface condenser tubes, 8¼d.

solid drawn copper tubes, 8¾d.; brazed copper tubes, 8½d.; brazed brass tubes, 8½d.; brass wire, 6½d.; copper wire, 7½d.; and rolled brass, 6d. per lb.

Business in the timber trade is quiet. Values are difficult to maintain, a decline in some articles being reported. Stocks generally are quite sufficient for requirements. Teak is coming forward too freely; the demand shows no improvement, but owing to advanced prices abroad, shippers are very firm, and disposed to yard freely. There has been a good consumption of greenheart, but stocks are equal to requirements.

In the coal trade business has steadily tapered off, and, of course, the position is by no means improved by the stoppage of work at the important engineering establishments. House coals, as is only to be expected at this time of the year, are only in the slowest possible demand, and even with pits working short time, stocks are increasing. Pit quotations are unchanged, but the actual sales on the basis of what may be termed list rates are so unimportant that these prices are scarcely more than nominal. In the open market, where sellers have to dispose of surplus quantities, prices are easier. Steam and forge coals have been in fair request, but the demand for these will necessarily be considerably reduced owing to the stoppage of engineering works and prices show less firmness. Engine fuel is not moving away so freely as of late, and prices are barely maintained at recent rates. At the pit mouth, best house-coal averages 9s. 6d. to 10s.; Pemberton four foot, and seconds Arley, 8s. to 8s. 6d.; common house-coal, 6s. 6d. to 7s.; steam and forge coal, 5s. 9d. to 6s. 3d.; and engine fuel, 3s. to 3s. 6d. for common; 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 4s. 9d. best qualities. Shipping has been fairly active, but prices show no improvement, ordinary steam coal being obtainable at about 7s. 3d. to 7s. 9d. delivered Mersey ports.

BELFAST TRADE NOTES.

(From our own Correspondent.)

IN sympathy with the cross-channel firms connected with the Employers' Federation, and as members of the Federation, nine firms posted lock-out notices on Tuesday evening, July 6th, these including Messrs. Workman, Clarke & Co., Limited, and Messrs. Combe, Barbour & Combe, Limited; intimating that the services of 25 per cent. of the members of the Amalgamated Society of Engineers would be dispensed with on July 13th. At a meeting held by the Amalgamated Society of Engineers in the Ulster Hall Annexe, an important decision was come to, the men determining to resist the employers as long as they could, and unfortunately a grave, and possibly a protracted and determined struggle seems to be inevitable. The strike notices handed in by 75 per cent. of the engineers who did not come within the first lock-out batches took effect on the same day, and it is estimated that some 2,000 men are thrown idle by the strike. Messrs. Harland & Wolff, Limited, has not as yet posted the lock-out notice, this would seem to augur ill for the employers, as the members of the Society on the Queen's Island by keeping at work will be able to afford very substantial assistance to their brother workmen on strike, while the employers will lack the support of such a strong firm. It is to be hoped that a satisfactory settlement will be arranged to bring the strike to an end.

The Orange celebrations in connection with July 12th made that week largely one of holiday in Belfast and throughout the North of Ireland generally.

At the bi-monthly meeting of the Belfast Harbour Commissioners held on July 6th in the Boardroom of the Harbour Offices, Corporation Square, it was agreed that the new branch dock, Dufferin Dock, Spencer Dock, and Albert Quay section No. 2, and of the County Down side of the harbour section No. 3, should be lighted by electricity, and the work to be proceeded with in accordance with the details set forth in the joint report of the engineer and Mr. Combe; and that the work be done at a cost not exceeding £11,000, including the erection of the necessary engine-house and providing for future extensions.

The Lord Chief Justice and the Lord Chief Baron were present at the launch from the yard of Messrs Harland & Wolff, Limited, of the large steel twin-screw steamer *Derbyshire*, built for the Eastern trade to the order of Messrs. Bibby Bros. & Co. Mr. Arthur Bibby was at Queen's Island himself to meet their Lordships. The Lord Mayor, Mr. W. J. Pirrie, J.P., taking the party, after the launch, round the works.

At the Larne Shipbuilding yard, Larne Harbour, an event of considerable interest to the people of Larne took place in the launch of a steel screw steamboat built to the order of Messrs. John Burrowes & Co., of Glasgow and Oban, for the Clyde and Forth canal.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow-in-Furness.—The shipbuilding trade of this district is in a somewhat more satisfactory position for two or three reasons. In the first place, it is a proof of the capacity of the Barrow yard in regard to the production of the best class of Admiralty work that the Government should have placed an order here for the building of a battleship; in the second place, the big shipbuilding business at Barrow has changed ownership, and is now held by a most enterprising firm, who are ready and determined to go in for a fuller programme of Admiralty work, and shipbuilding construction generally for the home as well as foreign Governments; and in the third place, it is known that a few enquiries are to hand for commercial tonnage which are likely to result in orders for Barrow. The first part of the keel plates of H.M.S. *Vengeance* was laid on July 26th, and the work of constructing this vessel will be proceeded with forthwith, or so soon as the necessary material can be obtained. The battleship will be built on the ways from which the *City of Rome*, the *Empress of India*, the *Powerful* and the *Niobe* were launched. The ground is hard and has been well tested for its solidity and firmness. There is no need at Barrow to build ships in a dock and float them out, and the slipway is exceedingly large, has the proper easy incline, and the launching area is broad and expansive. What, however, is wanted at the Barrow yard is more work to do. The *Vengeance* is being built alongside the *Amphitrite*, a first-class cruiser, and there is also building in another part of the yard the *Duke of Cornwall* for the Fleetwood and Belfast service. This is all the work the company has on hand in the shipbuilding department. It is not over-estimating the capacity of the Barrow yard when it is said that at least four times as much work could be put down at one time. In fact, there is width enough and launching area sufficient for twenty big vessels at one time. It remains to be seen how far the new owners of the yard will take advantage of the capacity of the works. Much as to this development will depend on the state of the shipbuilding market, but the Barrow yard is quite equal to an output of 100,000 tons of shipping per year. The *Amphitrite* is so well forward in construction that she is expected to be launched at the close of the year, and as probably on her ways another big ship will be put down, the work of completing her to be launched as soon as possible is proceeding very smartly. The *Duke of Cornwall*, the twin-screw paddle steamer for the Fleetwood and Belfast Co., is well in frame and will soon be plated. From an engineering point of view, the trade in this district recently has not been very satisfactory, that is to say, that work has not been plentiful, and the concern has not been able to maintain its usual briskness. The consequence was that before the engineers strike commenced a very large number of men were paid off. It is expected that an improved tone will be effected in engineering, as new work is coming to hand and more is expected shortly. At the same time the strike or lock-out is having a very serious effect on the work in hand, although some good work is being done by means of the apprentices, which, in a yard like that at Barrow, number quite 150. During the third week in July the work of completing the s.s. *Joseph Thompson* was accomplished. She was only launched on the 14th of July, and was ready for delivery to the Manchester Corporation, her owners, a fortnight afterwards. She is practically an exact copy of the six sludge steamers built at Barrow for the London County Council, and which carry out sewage to sea. This will be done by the Manchester Corporation by the Ship Canal, and the *Joseph Thompson* is the first of a fleet of boats intended for this purpose. It is satisfactory to note that the Great Western Railway Co.'s steamer *Roebuck* has already proved herself the fastest steamer on the Channel Island service. Her sister ship, the *Reindeer*, is expected to do equally well. The *Duchess of Devonshire*, built for the Barrow Steam Navigation Co., to steam 19 knots, has been put on the Barrow and Douglas station, and is found easily to maintain 20 knots an hour. This reduces the sea passage from Barrow to Douglas to 2½ hours. There is

at present quite a shipbuilding interest in the Isle of Man traffic, as not only has the Barrow Co. put on a new 20 knot steamer, but the Isle of Man Steam packet Co. has put on the new *Empress Queen*, which steams 25 knots. The representatives of the Japanese Legation paid a visit to Barrow some time ago to inspect the works of the Naval Construction and Armaments Co. They are paying a second visit this week, and will see the arrangements that are in progress for putting down a new British battleship. It was a good thing for Barrow builders when they got the order for a British man-of-war, as it will doubtless lead to the securing of work from foreign governments, and especially so as Messrs. Vickers are able not only to build and engine warships, but to fix them up with their own highly reputable armour plates, and with their own manufacture of guns. The shareholders of the Naval Construction and Armaments Co. have received from the liquidator cheques in payment of capital and interest in full, and now the concern, except for the ordinary winding up details, is no more.

A HEAVY BRONZE TAIL SHAFT.

THE Phosphor Bronze Co., Limited, of Southwark, London, have recently supplied to Mr. J. S. White, of Cowes, a tail-shaft forged in Bull's Metal, for the steam yacht *Waterlily*, which, we believe, is the heaviest forged bronze shaft ever fitted.

The finished diameter of the shaft is 6¾ in., the rough weight 9½ cwt., finished weight 17 cwt.

The shaft was forged from a billet 14 in. diameter, weighing 24 cwt., and had to pass Lloyd's tests. It was, therefore, forged 10 in. longer than required, and test pieces were machined from the end. Two of these pieces, tested by Mr. J. S. White, at Cowes, gave 28½ tons per square inch tensile strength, with 35 and 36 per cent. elongation on 6¼ in. length. The tested diameter was ¾ in.

The uniformity of the alloy is shown by the breaking load, which was 19,593 lbs. in the one case, and 19,590 lbs. in the other.

Mr. J. S. White writes the Phosphor Bronze Co. as follows in respect to these tests:—"You will observe from the above that the breaking load was 28½ tons per square inch. I am very pleased with the behaviour of the metal, and certainly think it is of a most uniform nature, and more like mild steel than any other bronze I have met with."

A third bar tested under the supervision of Lloyd's surveyor by Mr. W. H. Stanger, gave the following results. (Table I.)

As a remarkable proof how the shape of test bars affects results obtained we may mention that two flat bars with a too small radius under the shoulder were also broken by Mr. W. H. Stanger under the same supervision, the results being as per Table II.

The Phosphor Bronze Co. have during the last few years supplied approximately 200 tail-shafts in Bull's Metal, which are all giving great satisfaction. The present alloy is specially designed to pass Admiralty tests and requirements.

The table below gives the latest general tests of Bull's Metal forged, rolled and cast. The difference in the results obtained with the forged metal (compared with the figures mentioned in connection with the shaft) is explained by the difference in the size of the forgings, the smaller forging being more affected by the work put on it.

Summerlee Pig Iron.—Messrs. The Summerlee and Mossend Iron and Steel Co., of Coatbridge and Glasgow, have appointed Messrs. William Reid & Co., of 112, Fenchurch Street, London sole agents for London and district, for the sale of their famous brand of "Summerlee" Pig Iron, also steel plates, angles, etc.

TABLE I.

Test Number.	Dimensions. Diameter.	Area Sq. Inches.	Reduction of Area at Fracture.	Extension		On Original Area.			
					On 2 in. at Fracture.	Elastic Limit.		Maximum Stress	
				per cent.	per cent.	Pounds Per Square Inch.	Tons Per Square Inch.	Pounds Per Square Inch.	Tons Per Square Inch.
10,522	0·748 in.	0·4394	36·0	(on 6 in.) 37·6 (On 4 in.) 41·6	45·0	25,289	11·29	64,870	28·96

TABLE II.

W.S.H. Test Number.	Dimensions.	Area Sq. Inches.	Extension on 7 inches.	On Original Area.				Remarks.
				Elastic Limit.		Maximum Stress.		
				Pounds Per square inch.	Tons Per square inch.	Pounds Per square inch.	Tons Per square inch.	
10,495	1·505 in. × 0·495 in.	0·7449	18·7 %	28,358	12·66	59,225	26·44	Broke outside Datum points.
10,496	1·505 in. × 0·495 in.	0·7449	18·2 %	27,374	12·31	58,217	25·99	Ditto.

Test Number.	Marks. W.S.H. inches.	Dimensions. Diameter. Inches.	Area Square inches.	Reduction of area at fracture.	Extension.		On Original Area.				Remarks.
					on 8 in.	On 2 in. at fracture.	Elastic Limit.		Maximum Stress.		
				Per cent.	Per cent.	Per cent.	Pounds per sq. in.	Tons. per sq.in.	Pounds per sq. in.	Tons per sq.in	
9,929	2	0·749	0·4406	22·1	23 6		39,401	17.59	70,358	31·41	Forged.
9,931	3	0·623	0·3048	37·9	8·1		63,212	28.22	89,443	39·93	Rolled, *Hard Finish*
10,038	NONE	0 690	0·3739	37·8	20·0 (on 6 in.)	26·0	59,920	26·75	78,422	35 01	Rolled, *Medium Finish*
10,422	E 2	0·688	0·3717	306	29·0	32·0	29,657	13·24	70,492	31·47	Cast, *Soft.*
9,932	C 3	0·750	0·4418	24·2	22·0		36,108	16·12	86,643	38·68	Cast, *Hard.*

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Dora.—On June 5th a steel sailing barge of about 301 tons, named the *Dora*, was launched at South Shields for the Goole and Hull Steam Towing Co., Goole.

Prince Ferdinand de Roumanie.—On June 14th a steel steam ketch of about 130 tons, named the *Prince Ferdinand de Roumanie*, was launched at North Shields for the European Commissioners of the Danube.

Etruria.—On June 15th Messrs. Cochrane & Cooper launched at Beverley, for Messrs. E. J. Williams & Co., Limited, Hull, the iron steam trawler *Etruria*, a vessel of 180 tons gross.

Hylton.—On June 16th the Strand Slipway Co. launched at Sunderland, for Messrs. Fenwick, Stobart & Co, the steamer *Hylton*, a vessel of 1,450 tons gross. She is intended for the coasting trade.

Wren and Quail.—On June 16th Messrs. Edwards Bros. launched at Shields, for Messrs. Kelsall Bros. & Beeching, two steam trawlers, *Wren* and *Quail*, each about 142 tons gross.

Rialto.—On June 17th an iron steam ketch, of about 150 tons, named the *Rialto*, was launched at Beverley for Mr. G. F. Sleight, of Grimsby.

Faraday.—On June 19th an iron steam ketch of about 175 tons, named the *Faraday*, was launched at Hull for Messrs. F. & T. Ross, Limited, of Hul .

Coningsby.—On July 1st Messrs. Ropner & Son, Stockton-on-Tees, launched a steel screw steamer, for Messrs. Gladstone & Cornforth, West Hartlepool, of the following dimensions, viz.:—Length, b.p., 325 ft.; breadth, extreme, 46 ft.; depth, moulded, 24 ft. 9 in. Built on the three-deck rule, has double-bottom on the cellular principle for water-ballast, and has been designed to carry a deadweight cargo of about 4,800 tons on a light draught; she will have all the most recent appliances for the expeditious loading and unloading of cargoes, and will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co., Limited, working at a pressure of 210 lbs. The christening ceremony was performed by Miss Sibyl Gladstone, who gave her the name of *Coningsby*.

Whitehall.—On Thursday afternoon, July 1st, Messrs. Craig, Taylor & Co. launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a handsomely modelled steel screw steamer of the following dimensions, viz.: 280 ft. by 41 ft. by 18 ft. 9 in. She is of the partial awning deck type, and is fitted with water ballast in cellular double-bottom fore and aft, except under boilers. The vessel is constructed to carry a deadweight of about 3,100 tons on a light draught of water, and is provided with four steam winches, steam windlass, steam steering gear, large donkey boiler, screw gear aft, and all modern improvements. Her machinery is being constructed by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, Middlesbro', the cylinders being 20 in., 32½ in., 53 in., and 36 in. stroke, with two boilers working at 160 lbs. pressure. The vessel has been built to the order of Messrs. Furness, Withy & Co., Limited, West Hartlepool, for whom Messrs. Craig, Taylor & Co. have just built two similar vessels. The christening ceremony was gracefully performed by Mrs. A. H. Walker, of West Hartlepool, wife of the shipbuilding surveyor for Messrs. Furness, Withy & Co., Limited.

Monarch.—On Thursday afternoon, July 1st, there was launched from the East Yard of C. S. Swan & Hunter, Limited, Wallsend-on-Tyne, a new steamer built to the order of Sir Christopher Furness, of West Hartlepool, for Messrs. Elder, Dempster & Co., of Liverpool, to run in their American trade. This steamer is a sister ship to the steamship *Milwaukee*, which was launched last year by the same builders and for the same owners, and which was the largest carrying English-built steamer afloat. Since then no larger steamers have been launched in England; and these two vessels still retain the distinction of being the largest steamers yet built in England. The new steamer, which is appropriately called the *Monarch*, is 483 ft. long, over all, by 56 ft. beam, by 42 ft. 3 in. depth to the shelter deck. Like the *Milwaukee*, she has been specially constructed for Messrs. Elder, Dempster & Co 's trade, is built to take the highest class at Lloyd's on the three deck rule, with shelter deck for cattle, and has scantlings above the rule requirementswith a view of offering an exceptionally powerful resisting force to the heavy Atlantic weather to which she will be subjected. The upper or shelter deck is flush, with the exception of the 'midship portion, on which will be placed steel houses for the accommodation of the captain, officers, passengers, and engineers, also the entrance to the galley, engine-room, &c. Above these houses on high skids will be carried the ship's boats. The shade deck and also the 'tween decks will be fitted for the conveyance of cattle; stalls of the latest types, together with ample fresh water service, will be fitted, and the ship will be arranged with a large number of hatches for promptly handling the enormous cargoes which she will take, and for this purpose about a dozen powerful steam winches with side derricks and whips will be fitted. The measurement cargo which the *Monarch* will carry will amount to upwards of 18,000 tons, in addition to about 700 tons of permanent bunker capacity, whilst her deadweight cargo capacity will be 11,500 tons. For trimming the ship when light water ballast will be carried in the double-bottom throughout, and also in a deep 'midship tank, the total capacity amounting to nearly 3,000 tons. These tanks can also contain fresh water for the use of cattle, while fresh water condensers for the same purpose will also be supplied. A complete installation of electric light, including masthead sidelight and Suez Canal lights, will be provided by Messrs. Allen & Co., of London. John Campbell & Sons self-adjusting accommodation ladders will be supplied for giving access to the steamer from small craft. The propelling machinery has been constructed and will be supplied by the Wallsend Slipway and Engineering Co., Limited, of Wallsend, and consists of an exceptionally massive set of triple-expansion engines, having cylinders 28½ in., 46½ in., and 80 in. diameter respectively, with a stroke of 54 inches. The steam will be supplied at 180 lbs. pressure by three large boilers fitted with Howden's system of forced draught, whilst in order to still further economise fuel and increase speed the propeller will be fitted with the Manganese Bronze Co.'s blades. In addition to Lloyd's classification, the steamer has been constructed to the requirements of the Board of Trade and the German law, so as to adapt her for any trade, and to enable her to be taken up at any time as a passenger steamer. During construction the *Monarch* has been under the special survey of Captain Evans, representing Messrs. Elder, Dempster & Co., and Mr. A. H. Walker, on behalf of Messrs. Furness, Withy & Co., whilst the machinery has been under the superintendence of Mr. C. Lees, Mr. J. F. Kitching, and Mr. Alexander Taylor. A large number of guests and spectators assembled to see the launch of this fine vessel, which on the stocks presented a very handsome appearance, and was much admired by naval experts present. Amongst the guests may be mentioned Mr. Alfred Lewis Jones, the head of the firm of Messrs. Elder, Dempster & Co., and who appeared very sanguine of the success of his fine steamer, and expressed himself as being well pleased in all respects. There were also present: Mr. A. L. Jones, Mrs. John Pinnock, Miss Pinnock, Mr. Lawrence Jones, Mr. David Jones, Mr. Ward, Mrs. Ward, Captain Graham, Mr. and Mrs. G. Neville, Mr. H. S. Flinn, Captain J. Evans, Mr. Lees, Sir Christopher Furness, Lady Furness, Miss Furness, Mr. Stephens, Mr. J. H. Harrowing, the Rev. Principal Gurney and Mrs. Gurney, Mr. Richard Clayton, Mr. and Mrs. W. R. Allden, Mr. and Mrs. W. F. Allden, Mr. W. B. Mulcaster, Signor Bruzzo, Signor Santamarina, Consul for Spain; Mr. Robert Hume, of Port Hope, Canada; Mr. W. S. Daglish, Mr. and Mrs. F. B. Davis, Signor Anfossi, Italian Consul; Alderman and Mrs. Sutherland, and many others. Punctually at the time appointed the steamer was successfully launched, and named the *Monarch* by Miss Pinnock, niece of Mr. Alfred L. Jones, the lady having kindly journeyed from Liverpool for the occasion. The launch was in every way satisfactory, and after the ceremony the guests were entertained by the shipbuilders in the drawing office, Mr. G. B. Hunter, the chairman of the company, presiding. It will be of interest to state that C. S. Swan & Hunter, Limited, have at the moment building for Sir Christopher Furness a steamer of considerably larger dimensions and capacity than the steamship *Monarch*, being over 500 ft. in length. The machinery for this vessel will be supplied by Sir Christopher Furness, Westgarth & Co., of Middlesbrough, and will consist of a set of twin-screw engines with the latest improvements, and capable of developing about 6,000 H.P.

Duchess of Kent.—On July 1st was launched the saloon paddle-steamer *Duchess of Kent*, built and engined by Messrs. Day, Summers & Co., Southampton, for London and South Western and Brighton Joint Railway Cos. Her principal

dimensions are:—Length, between perpendiculars, 195 ft.; beam, moulded, 26 ft.; depth, moulded to main deck, 9 ft. 6 in. The vessel is built of steel and to Board of Trade requirements for passenger certificates Nos. 3 and 4 for Channel purposes. Six transverse bulkheads are fitted, dividing the ship into seven watertight compartments. The first-class passengers' accommodation is situated aft, and comprises spacious and well-ventilated dining saloon below main deck, the general saloon, which extends the full width of the vessel, is fitted over dining saloon on main deck. The second-class passengers' accommodation is forward, with dining and deck saloons; seamen's and firemen's quarters are fitted forward. A large promenade deck, extending well forward and aft is fitted up with smoking-room; ticket office amidships; captain's house and flying bridge at fore side of funnel. The vessel is fitted with a complete installation of electric light, lamps being fitted to all spaces throughout the ship, the current being generated by one of Messrs. J. H. Holmes & Co.'s dynamos, driven by Chandler engine, conveniently placed in the engine-room. The vessel is fitted with diagonal surface condensing compound engines, having cylinders 32 in. and 59 in. diameter, with a stroke of 60 in., steam pressure 110 lbs. per square inch to Board of Trade requirements. The paddle wheels are on the feathering principle, of large diameter, and fitted with curved steel floats. Crank shaft of Vickers' steel, and to give lightness combined with strength, steel has been largely used in the construction of the machinery. Water is circulated through the surface condenser by one of Messrs. W. H. Allen & Co.'s centrifugal pumps. Messrs. G. & J. Weir supply one of their duplex double-acting pumping engines for feeding the boiler, the water passing through one of Edmiston's patent feed filters before entering the boiler. Steam is generated in one large double-ended boiler, fitted with Morrison's patent suspension furnaces. Engine and boiler rooms are separated from each other by a watertight bulkhead. An auxiliary pumping engine on the Worthington principle is fitted for feeding the boiler and also for pumping out the bilges of each compartment. The centrifugal circulating pump being also fitted with a large suction from the bilge for use in case of emergency.

Sceptre.—On Saturday, July 3rd, Messrs. William Gray & Co., Limited, launched a fine steel screw-steamer which they have built to the order of Messrs. Hall Brothers, of Newcastle-on-Tyne. She will take Lloyd's highest class, and in some parts the scantlings are in excess of Lloyd's, particularly under the boilers. The dimensions are:—Length over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant-forecastle. A handsome saloon and cabins for officers, etc., will be fitted in the poop, the engineers' rooms in the bridge, and the crew's accommodation forward. The hull is built on the web frame principle, with a cellular double bottom, large hatchways, five powerful steam winches, steam steering-gear amidships, hand screw-gear aft, horizontal multitubular donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. William Gray & Co., Limited, supply triple-expansion engines having cylinders 23 in., 36 in., and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The hull and machinery have been built under the superintendence of Captain William Lowrie and Mr. R. Williams on behalf of the owners, and the ceremony of naming the ship *Sceptre* was gracefully performed by Mrs. Mein, wife of Mr. M. M. Mein, partner of Messrs. Hall Brothers.

Sylvia.—On Saturday afternoon, July 3rd, Messrs. William Doxford & Sons, Limited, launched from their yard at Pallion the second of the torpedo boat destroyers which the firm are constructing for Her Majesty's Government. Like her sister vessel she has a speed of 30 knots per hour. She has a displacement of 300 tons, and the engines will develop 6,000 H.P. The vessel was launched with her machinery on board so that the steam trials will be commenced immediately. On moving down the ways the boat was christened *Sylvia* by Mrs. James Patterson, of Dalkeith.

Golden Eagle.—On July 3rd a steam trawler was launched, named the *Golden Eagle*, at Beverley, for Messrs. Hall, Leyman & Co., Limited, of Hull.

Indianic.—This vessel was launched on Tuesday July 13th, by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and is built to the order of the Atlantic Steam Shipping Co., Limited, Sunderland, the managing owner being Mr. T. G. Greenwell, of Sunderland. Her principal dimensions are:—Length, between perpendiculars, 326 ft.; breadth, extreme, 47 ft.; and depth, moulded, 24 ft. The vessel is built to Lloyd's highest class, and is constructed on the improved single-deck principle, with deep frames, cellular double bottom, and iron longitudinal bulkheads. She has a cargo poop and bridge, and a topgallant forecastle for crew. The saloon house, with accommodation for captain, steward, spare berths, pantry, &c., is on the forward end of the bridge, above this being placed the chart-house. The accommodation for the officers and engineers is also amidships. The steam steering gear is placed in the after-end of the engine casings, and is connected by controlling gear with the upper bridge. The vessel is fitted with powerful steam winches to each cargo hatch, and a patent capstan windlass, these being supplied with steam by a large multitubular donkey boiler working at 180 lbs. pressure. The vessel is designed to have a deadweight cargo capacity of about 4,850 tons, and is arranged to have a very large cubic capacity space in relation to her register tonnage. The engines and boilers have been constructed by the North Eastern Marine Engineering Co., Limited, of Sunderland, the sizes of cylinders being 23 in., 38 in., 62 in. by 42 in. stroke, supplied with steam at 180 lbs. pressure. The vessel was christened by Master T. G. Greenwell, grandson of the managing owner, and launched by hydraulic power by Miss Louisa Greenwell, daughter of the managing owner. The vessel has been specially constructed and is complete with every requisite for the Indian and American trades.

Hummersea.—On July 13th Messrs. R. Craggs & Sons launched at Middlesbrough a steel twin-screw steamer of the following dimensions:—Length, 171 ft.; breadth, extreme, 26 ft. 9 in.; depth, moulded, 12 ft. 3 in. The vessel has self-stowing arrangement for carrying pig-iron, and will take Lloyd's highest class. She has been built to the order of the Skinningrove Iron Co., Limited, Yorkshire, for their special trade, under the inspection of Mr. James Thompson, of Sunderland. She will be fitted with twin-screw engines by Sir Christopher Furness, Westgarth & Co., Limited, having cylinders 10 in., 15 in. and 25 in. by 18-in. stroke. The vessel was named the *Hummersea* by Miss Hutchinson, eldest daughter of Mr. T. C. Hutchinson, managing director of the Skinningrove Iron Co., Limited.

Tourquenois.—On July 14th an iron steam trawler, named the *Tourquenois*, was launched from the yard of Messrs. Cochrane & Cooper at Beverley. The trawler, which is for a Belgium firm, is of the following dimensions, namely:—110 ft. long, 21 ft. beam, and 11 ft. 6 in. depth of hold. Her engines of 60 N.H.P. will be supplied by Messrs. C. D. Holmes, of Hull.

Cheerful.—On July 14th her Majesty's ship *Cheerful* was launched from the Hebburn shipbuilding yard of Messrs. R. & W. Hawthorn, Leslie & Co., Limited. This vessel is one of two being constructed by this firm, and is one of the largest type of torpedo-boat destroyers. Her length is 210 ft., breadth, 21 ft.; and depth, 12 ft. 6 in.; displacement, 308 tons. The main propelling machinery consists of two sets of vertical triple-expansion engines, in the construction of which steel and the strongest bronzes have been used, with a view of combining lightness and strength. The engines at full power will develop 6,000 I.H.P. when running at about 380 revolutions per minute. Steam will be supplied by four Thornycroft water-tube boilers working at 250 lbs. per square inch, and arranged in two separate compartments.

Spartan Prince.—On July 14th Messrs. Short Brothers launched from their shipyard at Pallion, Sunderland, a finely-modelled steamer of about 5,000 tons capacity, which they have built for the Prince line of steamers. The vessel is intended for the emigrant and cargo business between the Mediterranean and the United States, has excellent first-class passenger accommodation amidships, large saloon and music-room, and comfortable smoking-room on the bridge deck. The state-rooms are fitted up in first-class style, very roomy, commodious, and specially well ventilated; the electric light is fitted throughout. The propelling machinery consists of a set of triple-expansion engines of 2,500 I.H.P. supplied by Messrs. Blair & Co. As the vessel left the ways she was christened *Spartan Prince* by Mrs. Scott, wife of Mr. C. H. Scott, of West Bank, Heaton Mersey, Manchester, chairman of the Prince Line. She is a similar

type of vessel to the well-known and successful steamer *Tartar Prince*, also built at this yard for the same company, but is of somewhat finer lines, larger dimensions and carrying capacity.

Harmony.—On July 14th Messrs. Austin & Son launched at Sunderland the steel screw steamer *Harmony*, constructed to the order of a London firm of shipowners for the Continental coal trade. The vessel has been designed for a deadweight carrying capacity of about 1,450 tons, and she will be classed 100 A1 at Lloyd's under special survey. Her machinery will be supplied by Messrs. John Dickinson & Sons, Limited, and will be of the tri-compound type.

Perseus.—On July 15th Earle's Shipbuilding and Engineering Co. launched from their yard at Hull H.M.S. *Perseus*, a third-class cruiser, 300 ft. long, and of 2,150 tons displacement, for the British Navy. The vessel is well advanced and at the time of her launch had her boilers on board, as well as sundry parts of her main and auxiliary machinery. The naming ceremony was undertaken by Lady Seager-Hunt, wife of the chairman of Earle's Co., and some thousands of people assembled to witness the event.

Tunstall.—On Thursday, July 15th, Sir Raylton Dixon & Co., Limited, launched from their Cleveland Dockyards, Middlesbrough, a fine cargo steamer built to the order of Messrs. Furness, Withy & Co., Limited, of West Hartlepool. Her principal dimensions are:—Length, 325 ft.; beam, 43 ft.; depth, moulded, 22 ft. 11 in., and has a deadweight carrying capacity of about 4,200 tons on 19 ft. 6 in. draught of water. She is built to British Corporation highest class, single deck rule, and has water-ballast in after peak, and cellular bottom, with upper, poop and bridge decks of steel, and five watertight bulkheads, &c. The accommodation for captain and officers will be handsomely fitted up in houses on bridge-deck, with engineers under the bridge, and crew in topgallant forecastle. Triple-expansion engines will be fitted by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, Middlesbrough, having cylinders 22 in., 36½ in., 60 in. by 42 in. stroke, supplied with steam by two large single-ended boilers. On leaving the ways the vessel was gracefully named *Tunstall* by Mrs. A. H. Walker, of West Hartlepool. This vessel is the seventh that her builders have constructed to the order of Sir Christopher Furness, and they have now in hands for him the largest cargo steamer yet built on the Tees, which is intended for the Canadian cattle trade.

Trentham Hall.—On July 15th there was launched from the Jarrow yard of Palmer's Shipbuilding and Iron Co., Limited, a large screw steamer of the following dimensions, viz.:—380 ft. by 45 ft. by 30 ft. 9 in., moulded. The vessel is constructed of steel to obtain Lloyd's highest class, and will be rigged as a two-masted schooner. She is of the three-deck type, with a poop, bridge, and forecastle. The poop is fitted for the accommodation of the crew. The bridge covers the machinery openings amidships, the accommodation for the captain and officers being in steel deck houses on top of bridge deck. The forecastle is fitted for storerooms, &c. Arrangements are made for carrying water ballast in a partial double bottom at aft and a deep tank amidships. The vessel is fitted with two steel decks extending all fore and aft, and she is divided into seven watertight compartments by means of six steel bulkheads. She will also be fitted with a complete system of shifting boards, grain hatches, and all the latest requirements for carrying grain cargoes in bulk. A powerful steam windlass is fitted for working the cables, and a steam steering-gear amidst, and all necessary steam winches and derricks for the rapid loading and discharging of cargoes will be supplied, and the vessel will be fitted with all the most modern improvements for a vessel of her class, and is designed to load about 640 tons deadweight on about 24 ft. 9 in. draught. As the vessel left the ways she was christened the *Trentham Hall* by Mrs. Foster, wife of Capt. Foster, marine superintendent for the owners. The *Trentham Hall* has been built to the order of Messrs. R. Alexander & Co., of Liverpool, and has been constructed under the personal supervision of Mr. Dalrymple, superintending engineer of Liverpool, and Mr. Maxwell Hill, of Newcastle. After the launch the company adjourned to the office for refreshments, where the usual complimentary toasts were honoured.

Van Swoll.—On Thursday, July 15th, Messrs. Wigham Richardson & Co. launched from their Neptune shipyard, Newcastle-on-Tyne, a steel-screw steamer, which they are building to the order of the Koninklijke Paketvaart Maatschappij, of Amsterdam. The steamer is 280 ft. in length by 36½ ft. beam, by 19½ ft. deep, and will be rigged as a schooner. She has a shade deck all fore and aft, and is to have very comfortable accommodation for first and second class passengers, besides deck passengers. The engines and boilers are also being constructed by Messrs. Wigham Richardson & Co., and are designed to drive the vessel at a good speed. The owners were represented at the launch by Mr. Van Hasselt, the managing director of the company, Mr. de Bruyn Kops, naval director of the Hague, and Mr. Metzelaar, superintendent engineer to the company. As the vessel left the ways she was named the *Van Swoll*, the ceremony being gracefully performed by Miss Todhunter.

Clan Robertson.—On Saturday, July 17th, Messrs. William Doxford & Sons, Limited, launched from their yard at Pallion the s.s. *Clan Robertson*, the fourth of the turret-deck steamers building by the firm for the Clan Line Steamers, Limited, Glasgow and London. This vessel, like her sisters, is 400 ft. long, and carries 7,000 tons deadweight, steaming 12 knots. She is built under the special survey of the British Corporation, and during construction has been superintended for the owners by Mr. John Lyall and Captain J. E. Roberts, with their assistants, Messrs. Jackson, Black and Watts. The christening ceremony was performed by Miss Vera Doxford, daughter of W. T. Doxford, Esq., M.P. This latest launch brings the total number of steamers of this type now afloat up to thirty-three.

Iron Lighter.—On July 20th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, an iron lighter of the following dimensions:—Length, over-all, 70 ft.; beam, moulded, 17 ft. 6 in.; depth, moulded, 8 ft. 6 in., with a carrying capacity of 180 tons. The vessel was launched by the Rev. F. Tower, and is the third of an order for four, being built for Messrs. Thos. Wilson Sons & Co., Limited, Hull.

Rover.—Lately there was launched from the yard of the Co-operative Shipbuilding Society at Blyth, a steam trawler, built to the order of Mr. W. Purdy, jun., of North Shields, and named the *Rover*. The vessel will be engined by Mr. Gray, of Holborn Engine Works, South Shields, and is of the following dimensions:—Length, 70 ft. 6 in.; breadth, 18 ft. 5 in.; depth, 10 ft. 6 in.

LAUNCHES—Scotch.

Invergellie.—On June 14th Mr. W. Jarvis launched at Anstruther the wooden steamer *Invergellie*, a vessel of about 100 tons gross. She is owned by the Kilmory Steam Fishing Co.

Echo and Eddystone.—On June 16th Messrs. Mackie & Thomson launched at Govan, for the Great Northern Steam Fishing Co., Limited, the two steel-screw trawlers *Echo* and *Eddystone*, each of 165 tons gross.

Victoria Regina.—On June 19th a steam trawler, named the *Victoria Regina*, was launched by Messrs. Alexander Hall & Co., at Aberdeen. The vessel, which has been built to the order of Messrs. W. H. Dodds & Co., fish salesmen, Aberdeen and North Shields, is 110 ft. in length, 20 ft. in breadth, and 11 ft. in depth. She will be fitted with triple-expansion engines of 50 H.P.

Countess Cadogan.—On June 24th Messrs. J. M'Arthur & Co. launched from their yard at Paisley a fine little passenger steamer named *Countess Cadogan*, which has been built to the order of the Shannon Development Co., Limited. The new steamer is very finely fitted out, and supplied with every comfort and convenience to make her a first-rate tourist steamer. Engines of the compound surface-condensing type to propel the steamer at high speed are fitted by Messrs. Bow, M'Lachlan & Co., Paisley. The steamer was named by Mrs. Gilmour, wife of the secretary of the Shannon Co.

Fennia.—On June 25th there was launched from the yard of Messrs. Murdoch & Murray, Port-Glasgow, a steel screw steamer of the following dimensions:—Length, 230 ft.; breadth, 33 ft.; depth, moulded, 17 ft. 3 in., with long raised quarter-deck and bridge combined and topgallant forecastle. The vessel is to the order of the Wasa Nordsjo Angbats Aktie Bolag and is the third steamer built by the firm for this company. Triple-expansion engines will be supplied by Messrs. Kincaid & Co., Greenock. On leaving the ways the name *Fennia* was

given by Miss M'Bride. During the construction the ship has been under the superintendence of Capt. Emil Wallenius.

Cheltenham.—On June 29th Messrs. Archd. M'Millan & Son, Limited, Dumbarton, launched the steamer *Cheltenham*, which has been built to the order of Messrs. Galbraith, Pembroke & Co., of London. Her dimensions are 356 ft. by 44 ft. 6 in. by 28 ft. 6 in. Her gross tonnage is 3,500 tons. Carrying capacity, 5,750 tons. She is built with poop, bridge, and forecastle, and is fitted with all the most recent improvements. Triple-expansion machinery is being fitted by Messrs. David Rowan & Son, having cylinders 25 in., 42 in., and 68 in., by 45 in. stroke, capable of driving the vessel 10½ knots loaded. Her boilers are for 170 lbs. pressure, and are being fitted with Howden's forced draught.

Steam Ferry Boat.—On July 1st there was launched from the shipbuilding yard of Messrs. John Shearer & Son, Kelvinhaugh, a steel fore-and-aft screw steam ferry-boat for ferry service between Dartmouth and Halifax, Nova Scotia. The vessel is built to the order of the Dartmouth Ferry Commissioners for goods and passenger traffic, the dimensions being 140 ft. by 50 ft. by 13 ft. 7 in., with houses on each side of carriage way 13 ft. in height, extending for about three-fourths of vessel's length. The houses are handsomely fitted up for first-class passengers, with all the latest improvements in sanitary and heating apparatus, and a complete installation of electric light. The machinery is being fitted on board by Messrs. MacKie & Baxter, Govan, being two pairs of compound surface condensing engines, having cylinders 12 in. by 24 in. by 18 in. stroke, with two boilers of the gunboat type, 7 ft. 6 in. diameter, by 18 ft. long. The vessel has been built under special survey of Lloyd's and Board of Trade to the highest class.

Pennant.—On July 1st there was launched from the shipbuilding yard of Messrs. Scott & Sons, Bowling, a finely-modelled screw steamer of the following dimensions, viz., 180 ft. by 29 ft. by 13 ft., moulded, which they have built to the order of the Anglesey Shipping Co., Bangor, North Wales. The engines, which are triple-expansion of high power, are being supplied by Messrs. Barclay, Curle & Co., Limited, Stobcross Engine Works, Glasgow. On moving down the ways the steamer was named the *Pennant* by Miss Jones, of Erwfair, Bangor, North Wales.

Vizcaina.—On July 2nd, at Linthouse, Messrs. Alex. Stephen & Sons launched for Messrs. Ferguson & Reid, Glasgow, a steel screw steamer of highest class in Lloyd's, of the dimensions—290 ft. by 42 ft. 9 in. by 21 ft. 10 in., and fitted with triple-expansion engines (also made by Messrs. Stephen) having cylinders, 19½ in., 32 in., and 53 in. diameter by 42 in. stroke, having suitable boilers working at 180 lbs. pressure. As the vessel moved into the water she was named *Vizcaina* by Miss Marion A. Ferguson, of New York. The *Vizcaina* is intended for general carrying trades, for which she is equipped with all the most recent and approved appliances. Her construction was superintended by Mr. Peter Jackson, M.I.N.A., and she is expected to go to sea this month under command of Captain Shearer.

Smack.—On July 2nd Mr. Archibald Boyd, boatbuilder, Ardrossan, launched from his yard a smack of 40 tons. She was built to the order of Captain Kerr, Lochranza.

Resolute.—On July 5th Messrs. G. K. Stothert & Co., of Dundee, launched a new steel screw steamer, built to the order of the Severn & Canal Carrying Co., Limited, of Bristol and Gloucester. The principal dimensions are:—71 ft. over all; 15 ft. 9 in. beam; and 9 ft. deep, built entirely of Siemens-Martin mild steel, and fitted with compound surface-condensing engines, cylinders 14 in. and 28 in. diameter, by 22 in. stroke. The vessel was christened the *Resolute* and is the first of two screw steamers building by that firm for the same owners, and they are intended for the towing trade between Gloucester and Worcester and the Bristol Channel ports.

Euclid, Eureka and Eton.—On July 6th Messrs. Mackie & Thomson, Govan, launched three steam trawlers, *Euclid*, *Eureka*, and *Eton*, which they have built for the Great Northern Steamship Fishing Co., Hull. The vessels are of 160 tons each, and will be supplied with triple-expansion engines by Messrs. Muir & Houston, Kinning Park.

Liverpool.—On July 9th Mr. D. M. Cumming, Blackhill Dock, launched a steel screw lighter named *Liverpool*. She is 70 ft. by 19 ft. by 6 ft. 6 in., and is being fitted with a pair of high-pressure engines by Messrs. Shanks, Morrice & Co., Eastwood Engine Works, Pollokshaws.

Mayflower.—On July 15th the Ailsa Shipbuilding Co. launched for Messrs. T. S. Duff & Co., of Glasgow, a steel screw steamer of the following dimensions:—Length, between perpendiculars, 230 ft.; breadth, moulded, 33 ft. 10 in.; depth, moulded to main deck, 17 ft. 3 in. She will be fitted with a set of triple-expansion engines, having 17 in., 27½ in., and 44 in. cylinders, with stroke of 33 in., by Messrs. Muir & Houston, Limited. On leaving the ways she was named the *Mayflower* by Miss Duff, Newtown, Sanquhar.

Fenchurch.—On July 15th there was launched from Messrs. Gourlay Bros. & Co.'s shipyard, Dundee, the *Fenchurch*. She has been constructed for Messrs. David Bruce & Co., under the superintendence of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, and is of the following dimensions:—Length, 330 ft.; beam, 45 ft.; depth, 27 ft.; gross tonnage, 3,300. She has two decks laid, high 'tween decks, water ballast in cellular double bottom, steering-gear fitted in engine-room with leading steering rods direct to tiller head. Powerful steam winch to each hatch and direct steam and hand windlass on forecastle head. Accommodation is well and conveniently arranged, that for crew being forward, the captain and officers with saloon placed on bridge immediately adjacent to flying bridge; engineers and assistant officers, is placed under bridge amidships on both sides, the engineers being close to the engine-room. The large space under bridge is so constructed as to be available for deck passengers, pilgrims, surplus coal, or general cargo. Hatches of a very large size have been constructed with a view to working large cargo. The christening ceremony was performed by Miss Evelyn Bell, daughter of Mr. Thomas Bell, Hazlewood, Dundee. After the launch she proceeded to the heavy crane to take in her machinery, which will consist of quadruple engines with boilers of large power working under forced draught.

Cruising Yacht.—On July 17th there was launched from the boat-building yard of Mr. A. Munro, Ardrishaig, a cruising yacht of the Lochfyne fishing type, to the order of Mr. W. Workman, Belfast. Length over all, 33 ft. by 9 ft. 6 in.; draught. 6 ft. 9 in. In her cabin there is accommodation for eight persons, while her forecastle is fitted up for two seamen.

Cathcart Park.—On July 21st Messrs. Carmichael, M'Lean & Co., shipbuilders, Greenock, launched the steamer *Cathcart Park*, for Messrs. J. & J. Denholm, Greenock. She is 860 tons gross, 208 ft. in length, 29 ft. 9 in. in breadth, 18 ft. 6 in. in depth, moulded, and will be fitted with triple-expansion engines, with cylinders 16 in., 26 in., and 44 in. each by 33-in. stroke, to register 700 I.H.P.

Steel Trawler.—Lately a steel trawler, built to the order of Messrs. Neale & West, Cardiff, has been launched from the yard of Messrs. John Duthie, Sons & Co., Aberdeen. The vessel's dimensions are:—Length, 105 ft.; beam, 20 ft. 6 in.; and depth of hold, 11 ft. 3 in. She will be fitted with compound surface condensing engines of 320 I.H.P., and 52 N.H.P.

LAUNCHES.—Irish.

Imani.—On June 29th Messrs. Harland & Wolff launched the screw steamer *Imani* from Queen's Island, Belfast. She is 400 ft. in length, with a tonnage of about 4,600. She will have two pole masts, fore-and-aft rigged, and be fitted with all the most approved appliances, including a most complete installation of electric light. Her propelling machinery consists of a set of triple-expansion engines, constructed by the builders of the vessel at their engine works. The new vessel is for Messrs. Edward Bates & Sons, and is intended to sail in their Eastern trade.

Royston Grange.—On June 30th a steel steamer of about 4,040 tons, named the *Royston Grange*, was launched at Belfast; owned by Messrs. Houlder Brothers, of London.

Petrel.—On July 3rd the launch of a steel screw steamboat for the Clyde and Forth Canal, built to the order of Messrs. John Burrowes & Co., Glasgow and Oban, took place from the Larne Shipbuilding Yard, Larne Harbour. A large number of ladies and gentlemen had accepted the invitations of the company to witness the launch. The ceremony of naming the steamer the *Petrel* was performed by Miss Sadie M'Kee, youngest daughter of Mr. J. M'Kee, Belfast Bank, Larne. The vessel on being

released glided gracefully into the waters of Larne Lough. The *Petrel* is intended for the carrying trade, and her machinery, which was constructed by J. D. Gauldie, Broomhall Engineworks, Glasgow, consists of compound surface condensing engines, 80 H.P., cylinders being 11 in. by 20 in. diameter, and the stroke 11 in. Steam is supplied from a steel boiler working at 100 lbs. pressure.

Derbyshire.—On July 21st Messrs. Harland & Wolff, Limited, launched the large steel twin-screw steamer *Derbyshire*, built for the Eastern trade to the order of Messrs. Bibby Bros. & Co. The new vessel is 452 ft. long by 52 ft. beam. She will have four masts, schooner-rigged, and will be equipped with powerful steam windlass and winches, patent steering gear, and many novel contrivances for efficient working, one special feature being the application of steam fans for ventilating all the cargo holds, and thus preserving the cargo from damage from heat. She is intended to carry a large number of passengers, and ample provision will be made for their comfort, including mechanical ventilation of the staterooms, baths, and refrigerators, to ensure an ample supply of ice and fresh provisions; while the electric light will be supplied throughout the ship. The *Derbyshire* will have two sets of triple-expansion engines of the most modern type, constructed by the builders of the vessel in their engineering works at Abercorn Basin.

TRIAL TRIPS.

Tai-Hoku.—On Thursday, June 24th, the fine mail and passenger steamer *Tai-Hoku*, built by Sir Raylton Dixon & Co., Limited, Cleveland Dockyards, Middlesbrough, to the order of the Osaka Shosen Kabushiki Kaisha, of Japan, was taken out to sea for her official trials, under the command of Captain Conradi. Her principal dimensions are:—Length, 343 ft.; beam, 43 ft.; depth, moulded, 28 ft. She is built to Lloyd's highest class, spar deck rule, with upper decks all of teak, main deck of steel, with water ballast in cellular double bottom. The accommodation is most elaborately fitted and arranged for 30 first-class passengers in forepart of bridge, with large dining-saloon, reading-room, smoke-room, &c., in house on bridge, and for 50 second-class at after-end of bridge and in poop, also for 300 emigrants in main 'tween decks. The vessel is also fitted throughout with a complete electric light installation and a large refrigerating machine and chamber for preserving and freezing provisions. Powerful triple-expansion engines have been fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders 28 in., 46 in., 77 in., by 48-in. stroke, supplied with steam by two double-ended boilers, 14 ft. by 16 ft. 6 in., and two single-ended, 14 ft. by 10 ft., working at 180 lbs. pressure. She is also fitted with a manganese bronze bladed propeller, See's ash ejector, Weir's evaporator, feed heater, &c. The vessel has been constructed under the personal supervision of S. Konishi, Esq. The owners of this steamer, by reason of her speed and superior equipment, will receive a subsidy from the Japanese Government for vessels fulfilling the requirements named by them. A large party of friends were on board during the trials, amongst whom were Sir Thomas Richardson, S. Konishi, Mr. Atsumi, Capt. Hubback, Mr. Katsura, Mr. Nagata, Mr. Hashizumi, and Mr. Drabble, representative of Messrs. Mitsui & Co., the Osaka Co.'s agents in London. Everything passed off most successfully during the six hours' run, a mean speed of over 15 knots being easily attained.

Moravia.—On June 28th this vessel, built by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, to the order of the Austrian Lloyd's Steam Navigation Co., Trieste, was taken on her loaded full-speed trials, and gave most satisfactory results. Her principal dimensions are:—Length, between perpendiculars, 354 ft.; breadth, extreme, 43 ft. 6 in.; depth, moulded, 25 ft. She has a deadweight capacity of about 5,500 tons with a moderate draught of water. She is built to Lloyd's 100 A1 class, on their three-deck rules, and has a poop aft, a long bridge amidships, and a top-gallant forecastle. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited. The engines are built on the triple-expansion principle, the sizes of the cylinders being 24 in., 40 in. and 64 in., by 45 in. stroke, supplied with steam by two large boilers working at 180 lbs. pressure. The trial took place on the Whitley mile, both progressive and full speed runs being taken. The mean of the full speed runs, with and against the tide, was about 10½ knots. She is the fifth vessel built by this firm for the Austrian Co., and is intended for their cargo and passenger trade.

Dobrogea.—On July 2nd the *Dobrogea*, built by Messrs. R. Napier & Sons, Limited, for the Direction Generale of the Roumanian State Railways, Bucharest, had a very successful trial on the Firth of Clyde, when all the conditions of the contract were fully implemented. The *Dobrogea* is the first of three steel screw steamers to carry 2,500 tons which Messrs. Napier have on hand for the Roumanian railway service, and these fine vessels have been specially designed to meet the requirements of the Government State Railways, and are intended to develop the important traffic from Roumania to the west of Europe. The general dimensions are:—Length, 300 ft.; breadth, 39 ft. 6 in.; depth, 24 ft. 6 in.; with a topgallant forecastle, long bridge, and full poop, and is constructed of steel on the deep frame principle, with a cellular double bottom all fore and aft, and built to the highest class at Bureau Veritas under special survey. The most modern appliances have been supplied for the efficient working of the ship and the rapid handling of cargo, including a complete installation of electric lighting throughout the vessel, and very comfortable accommodation for the captain, officers, and engineers on the bridge deck, the saloon being finished in bird's-eye maple and teak wood. The machinery consists of a set of triple-expansion engines, having cylinders 22 in., 35 in., and 58 in. in diameter, with two single-ended steel boilers for a working pressure of 178 lbs., and fitted with the most recent improvements for efficiency and economy. After a series of stringent trials in speed and consumption the representatives expressed themselves as highly satisfied with the favourable results obtained, the contract speed having been maintained for the stipulated time, with the specified deadweight on board, and upon the guaranteed consumption of coal.

Ambassador.—On Saturday morning, July 3rd, the s.s. *Ambassador* left the port of Hartlepool for her trial trip. She is a fine steel screw steamer, built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. Hall Bros., of Newcastle-on-Tyne. She takes Lloyd's highest class, and in some parts the scantlings are in excess of Lloyd's, particularly under the boilers. Her dimensions are:—Length over all, 324 ft.; breadth, 44 ft.; and depth 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, etc., have been fitted in the poop, the engineers' rooms are in the bridge, and the crew's accommodation forward. The hull is built on the web-frame principle, with a cellular double bottom, large hatchways, five powerful steam winches, steam steering gear amidships, hand screw gear aft, horizontal multitubular donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The engines are of the well-known triple-expansion type supplied by the Central Marine Engine Works of Wm. Gray & Co., Limited, and have cylinders 23 in., 36½ in. and 62 in. diameter, with a piston stroke of 39 in. Steam is supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. There were present on behalf of the owners Captain Lowrie and Mr. R. Williams (these gentlemen having superintended the construction of the ship and her machinery); Captain Murrell and Mr. T. Mudd represented the builders of the ship and engines respectively; Captain Beadle, who was in command of the ship; and amongst visitors were the Mayoress of Hartlepool and two Miss Mudd's, and Mr. and Mrs. Williams, of West Hartlepool. After the usual manœuvring of the ship in the bay for the adjustment of compasses, the vessel's head was turned northwards and a run made along the coast as far as the Tyne and back, the mean speed registered being 11·6 knots, and the performance of the ship and her machinery being in every respect satisfactory. The party of ladies and gentlemen having been taken off by tug boat, a southern course was set and the vessel proceeded to Cardiff, where she loads for the Black Sea.

Atlas.—On July 3rd the s.s. *Atlas*, a vessel built and engined by Messrs. Wm. Gray & Co., Limited, for Messrs. Rickinson, Son & Co., of West Hartlepool, left the Tyne loaded for Sulina. She is a vessel 336 ft. in length; breadth, 47 ft.; and depth, 24 ft. 10 in., and has been built to Lloyd's highest class. Her engines are of the triple-expansion type of 1,200 H.P., and have been manufactured at the Central Marine Engine Works. The construction of this ship and her machinery has been

carried out under the superintendence of Mr. Charles E. Smith, who has introduced two or three specialities in the machinery department, one of them being an extra injection for use in shallow water. The trial in this case went off without a hitch, and to the entire satisfaction of all concerned.

Kastalia.—On July 6th the *Kastalia*, a screw steamer, built for the fleet of Messrs. Donaldson Brothers, Glasgow, by the London and Glasgow Engineering and Shipbuilding Co., Govan, went on her trial trip in the Firth of Clyde. The vessel, which is 377 ft. long, 46 ft. 7 in. broad, and 29 ft. 6 in. deep, carries 6,200 tons deadweight, with a gross tonnage of about 4,300, and is fitted with all the most modern appliances for handling cargo. The spar-deck is fitted throughout for cattle, and the main deck is arranged so that it may be similarly used. The steam winches are on platforms raised sufficiently high above the spar deck to keep them clear of the cattle. The after 'tween decks are divided into four refrigerating chambers for the carriage of Canadian dairy produce, frozen meat, &c., the refrigerating machinery being by Messrs. J. & E. Hall, and the installation by the builders. Besides a double bottom on the cellular system all fore and aft, there is a large chamber tank abaft the engine-room capable of holding about 650 tons, and the fore-and-after peaks are also fitted for water ballast. The captain, officers, and engineers are berthed on the bridge deck, where are also placed the saloon and passenger accommodation. The crew are under the forecastle, and there is accommodation for a large number of cattlemen in the lower forecastle. The vessel has triple-expansion engines of the most modern type. The cylinders are 27 in., 44 in., and 72 in. in diameter, with a stroke of 48 in. The surface condenser is at the back of the engines, and like the air and circulating pumps, is of large capacity. The latter are worked by levers from the low-pressure engine, the feed and bilge pumps being driven by the same gear. There are four auxiliary steam pumps—one for ballast purposes—which may be used as a bilge pump or as an auxiliary circulating pump. There is also a duplex pump for general purposes, and a smaller duplex pump for the fresh water supply. For maintaining the supply of fresh water for the boilers a very large evaporator, made by Messrs. G. & J. Weir, is fitted in the engine room with the requisite connections, and in conjunction with the system of feed pipes discharging into the main boilers an Edmiston's feed water filter and a Hocking's feed water heater are introduced. The main boilers, two in number, are single-ended, and 15 ft. 4 in. in diameter by 11 ft. 9 in. long. Each boiler has three furnaces. They are fitted with Howden's forced draught, and the direct driven fan and engine have also been supplied by Messrs. Howden & Co. A winch boiler of large size is fitted in the stoke hold, and for discharging ashes a Galloway's ash hoist and automatic tip are fitted to one of the ventilators. All the arrangements, connections, and fittings are thoroughly complete, and everything has been done to make the handling of the engine department as economical and efficient as possible. The steamer went on the measured mile at Skelmorlie shortly before one o'clock, and with everything working smoothly the mean of four runs was easily 12 knots.

Empress Queen.—On July 8th the new paddle steamer *Empress Queen*, built by the Fairfield Shipbuilding and Engineering Co., Limited, for the Isle of Man Steam Packet Co., Limited, completed the official trials with highly satisfactory results. On four runs between Cloch and Cumbrae Lights she averaged over 22 knots per hour, and considering the stormy weather experienced the result was gratifying. The average speed over the whole course out to sea being 22 knots. The steamer is handsomely fitted out and a credit alike to owners and builders, and is certain to prove a great favourite on the run between Liverpool and Isle of Man. At the trials the Isle of Man Co. was represented by Mr. Mylrea, Mr. H. H. West, and Mr. Blackburn, and the Fairfield Co. by Mr. Sharer and Mr. Gracie.

Latharna.—On July 9th the steam yacht *Latharna*, belonging to Mr. Hugh H. Smiley, of Gallowhill, Paisley, and Larne, ran her trial in the Firth, when she attained a mean speed of fully 13 knots per hour, being considerably over the guarantee. The engines ran throughout the whole day without a hitch, and gave the greatest satisfaction. The vessel is fitted with a complete installation of electric light, refrigerating and ice-making plant, and hot water heating apparatus throughout, and all the most modern appliances for comfort and safety. The *Latharna* was designed by Mr. G. L. Watson, and was built by the Ailsa Shipbuilding Co., and engined by Muir & Houston.

Dauntless.—On Saturday, July 10th the fine steel screw steamer *Dauntless*, built for Messrs. Sutton, Brewis & Co., of Newcastle, by the Blyth Shipbuilding Co., Limited, of Blyth, had a most successful loaded trial trip. The vessel loaded a large cargo of Ashington coals and proceeded to sea with a numerous party on board, and on the various runs over the measured mile the results obtained were alike satisfactory to the owners and builders. The machinery was supplied by Messrs. Blair & Co., Limited, of Stockton-on-Tees. The *Dauntless*, under the command of Captain Graham, sailed for Cronstadt with the good wishes of all the visitors. Mr. Michael Havelock, of Newcastle, superintended the building of both ship and engines.

Craftsman.—On Tuesday, July 13th, the *Craftsman*, 450 ft. by 52 ft. 6 in. by 33 ft. 9 in., recently launched from the yard of Charles Connell & Co., at Whiteinch, went down the Clyde on her trial trip, the results of which were highly satisfactory. The engines, which are of the triple-expansion type, were fitted by Messrs. Dunsmuir & Jackson, Govan Engine Works, being 27½ in., 45½ in., 75 in. by 60 in. stroke. The boilers are fitted with Howden's forced draught, and there is also a complete installation of electric lighting. This vessel is an addition to the present large fleet of Messrs. T. & J. Harrison, Liverpool, and has been built under the superintendence of the company's engineers, Mr. Charles W. Cadman and Mr. William Sergent.

Panther.—On July 14th H.M.S. *Panther* went out on the Clyde for her official full-power speed trial in the presence of the Admiralty representatives. Six runs, as usual, were made on the measured mile, and were as follows:

	Steam.	Time.	Speed.
1st mile	220	1·57 3-5	30·61
2nd ,,	221	1·57 2-5	30·66
3rd ,,	223	1·58 1-5	30·46
4th ,,	224	1·57 1-5	30 72
5th ,,	219	1·58 4-5	30·30
6th ,,	223	1·56 2-5	30·93

The mean speed was equal to 30·57 knots, which is as high a performance as has hitherto been obtained with this class of vessel. The speed for the three hours' continuous steaming was well maintained, and the trial was not only successful, but satisfactory in every way. At the conclusion of the speed trial the full speed ahead and astern steering trials were carried out in a rapid and satisfactory manner, and the vessel returned to the Tail of the Bank, where she made and completed her anchor trials.

Vizcaina.—On July 15th the trial trip of the steamer *Vizcaina* took place on the Clyde. On the invitation of the owners (Messrs. Ferguson & Reid, 109, Hope Street Glasgow), and the builders (Messrs. A .Stephen & Sons, Linthouse) a select company of ladies and gentlemen joined the vessel at Gourock and enjoyed a pleasant run down the Firth. On the way home dinner was served in the saloon, and before the company rose "Success to the *Vizcaina*" was pledged heartily. The weather was delightful, and the trip was appreciated by one and all.

Llandudno.—On July 15th the new steamer *Llandudno*, recently built by Messrs. Ropner & Son, Stockton-on-Tees, for Messrs. Evan Thomas Radcliffe & Co., Cardiff, left the Corporation Wharf at Stockton for her official trial trip, which was made in the Tees Bay, and proved satisfactory. This steamer is of about 6,000 tons deadweight, and is an exact duplicate of the steamship *Windsor*, and is fitted with the builders' patent "trunk;" the machinery being supplied by Messrs. Blair & Co., Limited.

George Fleming.—On July 16th the steamer *George Fleming* left the shipbuilding yard of Messrs. Short Bros., at Pallion, Sunderland, for her trial trip, which proved in every way very satisfactory. After adjusting compasses a series of runs was made over the measured mile, and a mean speed of 11½ knots was attained. Her dimensions are:—Length, 352 ft.; breadth, 45 ft.; depth, moulded, 27 ft. 9 in.; and she will carry 5,800 tons deadweight, special attention having been given to the arrangement of the upper and main decks to enable a large number of cattle to be carried. Her engines are by Messrs. George Clark, Limited, of Sunderland, and have cylinders 24½ in., 40 in., and 66 in. by 45-in. stroke, and large boilers working at 180 lbs. pressure, and fitted with Howden's forced draught. The vessel has been con-

structed of steel to the highest class in Lloyd's Register for the Nitrate Producers' Steamship Co., Limited, of which company Messrs. Lawther, Latta & Co., of London, are the managers.

Ariadne.—On Saturday, July 17th, the s.s. *Ariadne* went from the Neptune Shipyard, Newcastle-on-Tyne, for a very successful trial trip. The vessel has been built by Messrs. Wigham Richardson & Co. to the order of the Finska Angfartygs Aktiebolaget, of Helsingfors, for their passenger service. She is of steel, 282 ft. in length by 38½ ft. beam by 22¾ ft. deep. She is rigged as a schooner, has a topgallant forecastle and a bridge amidships with a deckhouse on the top, and has very complete accommodation for a number of first-class passengers. The engines, which are of the triplex type, have, together with the boilers, been constructed by Messrs. Wigham Richardson & Co., and on the trial trip worked to the entire satisfaction of all concerned, driving the vessel at a speed of over 11 knots. The vessel is also provided with a very complete outfit of machinery for working both the ship herself and the cargo, including four steam winches, two steam cranes, steam windlass, steam steering gear, &c. The owners were represented on the trial trip by Mr. Hugo Lindfors, consulting engineer of Helsingfors, and the builders by Mr. J. Denham Christie and Mr. Muir. After the trial trip the vessel sailed to Middlesbrough under the command of Captain Gronholm.

Pallas.—On July 17th the s.s. *Pallas*, a vessel built by Messrs. Wm. Gray & Co., Limited, West Hartlepool, had her trial trip. The *Pallas* is intended for the timber and general cargo trades, and has been built for Messrs. Schmidt & Hansen, of Flensburg. She is the fourth steamer built and engined by Messrs. Wm. Gray & Co. for the same firm. She takes Lloyd's highest class, and her dimensions are:—Length overall, 270 ft.; breadth, 39 ft.; depth, 18 ft. 2 in. The hull is built with deep framing and cellular double bottom, and the equipment of the ship is of the most improved description. Her engines are of the triple-expansion type, built by the Central Marine Engine Works of Wm. Gray & Co., the cylinders being 19 in., 30½ in., and 51 in., with a piston stroke of 36 in. Steam is generated in two steel boilers working at a pressure of 160 lbs. per square inch. The vessel had on board a cargo of coal and coke, and the trial, which was witnessed by Captain Schmidt (of the firm of Schmidt & Hansen), and Mr. E. A. Casper, of West Hartlepool (through whom the transaction has been carried out), was in every way satisfactory, the vessel on its conclusion at once proceeding on her voyage to Helsingfors.

Ursula Bright.—On July 20th the large screw steamer *Ursula Bright*, recently launched from the shipbuilding yard of Messrs. John Priestman & Co., Southwick, left the Wear for her trial trip. The vessel has been built to the order of Messrs. W. Leatham Bright & J. G. Bright, of London, and is of the following dimensions:—Length, 336 ft.; breadth, 47 ft.; depth, moulded, 26 ft. 10 in. She has been constructed to the highest class of Lloyd's Registry for a three-decked vessel, and has a poop, long bridge, and topgallant forecastle. There are five steel bulkheads, and water ballast tanks have been fitted in the fore and after holds and in the after peak. On the bridge deck are large houses for the accommodation of captain, officers, and engineers, the crew having spacious accommodation under the topgallant forecastle. The engines and boilers have been built by Messrs. Blair & Co., of Stockton, the engines being triple-expansion, with cylinders 24 in., 40 in., and 66 in. diameter, with a stroke of 45 in. The two boilers are of the single-ended type, with a working pressure of 160 lbs. per square inch. Throughout the trial the engines worked without a hitch, and when the vessel was run over the measured mile a speed of 12 knots was attained, which was considered highly satisfactory.

Sir John.—On July 21st the new steamer *Sir John*, which has been built by Messrs. Gourlay Bros. & Co., of Dundee, was taken for her trial. She has been built for the Natal Government, under the superintendence of Sir John Wolfe Barry, K.C.B., F.R.S., &c., assisted by Messrs. Flannery, Baggallay and Johnson, of London and Liverpool, as resident engineers. The principal dimensions are:—Length, 150 ft.; breadth, 28 ft.; depth, 14 ft. She has been built to Lloyd's highest class, and under special survey, both as regards hull and machinery. The engines are of the triple-expansion type, having cylinders 16 in., 26½ in., and 42 in. by 27-in. stroke, and developed a speed of 13 3 knots per hour on trial. Steam is supplied by two large boilers working at 160 lbs. pressure. The vessel is supplied with a complete installation of salvage, pumping and towing gear, and electric light, including a powerful search light. The trial was in every way satisfactory, and was attended by the officials from the builders' yard, the Natal Government Office and the superintending engineers.

Thirlmere.—Lately the screw steamer *Thirlmere*, recently launched by Messrs. Robert Duncan & Co., Limited, Port-Glasgow, for Messrs. Herbert Watson & Co., of Manchester, went on her official trial trip on the Clyde, when a speed of over 11½ knots were attained on the measured mile, which was in excess of the guaranteed speed, and was considered highly satisfactory. The vessel is 280 ft. by 40 ft. by 20 ft. 6 in. moulded, and carries 3,100 tons deadweight on 17 ft. 6 in. draught, with a net register of 1,175 tons, and a measurement capacity for cargo of 150,000 cubic feet. She has been built to class 100 A1 at Lloyd's, of the single deck type, with forecastle, bridge, and poop, one deck laid, and deep frames with clear holds for convenient storage. The engines are of the triple-expansion type; cylinders, 20 in., 31½ in., and 53 in. diameter by 36 in. stroke; and boiler 15 ft. diameter by 11 ft. 6 in. long, 160 lbs. w.p. After completion of trial the steamer immediately left for Archangel in ballast, under the command of Captain Turner, to load a cargo of timber for the London market.

Reviews.

Railway Engineering: Mechanical and Electrical. By J. W. C. Haldane. London: E. & F. Spon & Co. 1897.

It is some few years since we last had the pleasure of discussing with our readers one of the books of this always interesting author. The subject of the present volume is one which is further removed than its predecessor from the work of marine engineering. Yet it is still most interesting and most attractive. One cannot help admiring the breezy style which is so characteristic of the writer. Nor can we help admiring the ingenuity (or fearlessness, shall we call it), with which he introduces any topic which interests him at the moment, whether, to ordinary ideas, it be germane to the subject under treatment or not. Take, for example, the account in the opening chapters of the tree-felling appliances. It is interesting enough—we hardly think the author could be dull—but it has nothing to do with the subject matter of the book. If his imaginary people had been tree-felling to clear a track for the rails, there might have been some connection, but this long and illustrated account comes in apropos of the clearing of the land of a new country for farming operations. But so it goes on. The specialities of various manufacturers, be they mechanical or scientific, are introduced and illustrated in the progress of the book, and yet no one would be inclined to accuse the author of making a mere catalogue of appliances and their makers.

Though the central idea of the book is to introduce the details of railway work as it exists to-day, by means of an account of the building of a new railway in a really non-existent island of the South Pacific, we are treated to many accounts of really existent and most important public matters. We have noticed the accounts of semi-private specialities. There are also afforded very readable accounts of such world-famous places as the Atlas Works, at Sheffield, and the London and North Western Railway works at Crewe. And in speaking of this line we notice that Mr. Haldane has fallen into what we may venture to call an error. He says that though the Midland Railway "abolished second-class in 1875, and so reduced its classes to two, it now has three classes again," because the Pullman has been introduced, and so in regard to the North Western he says, "there are now four classes," "a special saloon having been introduced." That these conveniences have been introduced, and we acknowledge them gratefully, we would be the last to deny. But they do not constitute a new class. For they are available to first-class passengers at ordinary fares. The drawing-room saloons, the lavatory accommodation, the special saloons are all available without extra charge. The only extras payable in the dining cars—which by the way are third as well as first class—are for food and drink actually consumed. Similarly in the sleeper the extra is for the bed, which could hardly be given in. Give the companies their due and admit that they have given these special facilities as inducements to passengers to pay ordinary first-class fare when ordinary third-class accommodation is good enough for all but the highest in the land.

It will be found that chapter twenty-three is given over to a

description of a certain establishment in the North where electric plant is made, and, no doubt, the details there afforded may help to instruct the reader on electric lighting generally, though it is hard to see how they apply to the electric lighting of railways. In the same way the long accounts of various types of water-tube boilers do not seem to have much bearing on the subject under discussion. We will not give other instances as we might. Suffice it to say that the book gives indications of close observation on the part of the author, and that the reader gets the benefit of it. Speaking of the permanent way we are told how the ends of the rails are made continuous. The use of "fish plates" is described. How many times have we all seen and heard of fish plates? Who of us has thought to enquire the origin of the term? Here it is, and it smacks of the briny. We know that when a broken spar in the old days was temporarily repaired by the carpenter and his mates it was said to be "fished." Well, here is the same use of the word. The ends of the two rails are "fished" by the "fish plates." The only fault we have to find with the book is that though it contains much of interest it does not contain so much regarding the general work of the engineer—it does not contain as much as it might about the development of that iron horse which has done so much during the present reign to revolutionise life on land.

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Lehr und Lesebuch der Englischen Sprache. By Franciscus Hahnel. Bremen: Gustav Winter. 1897.

This is a "compendium and reading book" for the self-teaching of the English language to German technical students. It is designed primarily for the use of marine engineers, shipbuilders, and electricians, though it would doubtless be of great value to any German who wished to attain a practical knowledge of the English tongue. The idea is, in the first place, to teach our language conversationally, and the subject matter of the conversations given is such as would naturally fall in the way of any foreigner who, from north European ports landed on our shores with business intent and with interest fixed or connected with the sea and with engineering. The difficulties which all foreigners find in the pronunciation of English are combatted by the insertion of phonetically written transliterations in German characters of all the English words which seem at all likely to offer difficulty to the student. The conversations are accompanied by pieces of English prose and verse for translation into German. These are exceedingly well chosen, being largely taken from the pages of British technical journals. A list of the sources of his information in this regard is given with the table of contents by the author, and here, as elsewhere, we find the name of the Marine Engineer in evidence. For example, at page 188 is reprinted, with due acknowledgment, an article which we published last year on Marine Engineering in the United States; whilst at page 231 will be found the report of the Summer Meeting of the English Institution of Naval Architects in Germany in 1896, just as it appeared in our own columns. This latter account follows a very interesting history of the origin and development of the North German Lloyd Steamship Co., an institution of which their countrymen may indeed be proud. A very concise English grammar is given in part 6, and here will be seen excellent lists of common English abbreviations, hints on punctuation, and several useful rules of English syntax. Part 7 comprises an English-German dictionary, and the whole volume closes with advice to the student to work up his English by the study of these technical English journals to which it has already introduced him. To sum up, it will, we hope, have been seen from our brief notice of the book that it does not waste the student's time by teaching him what is useless or unimportant. The whole time his attention is fixed on mastering English he is either chewing the cud of mercantile documents and business letters or else he is learning little matters connected with the working of the profession for which he is training. The book is practical indeed, and it seems as thorough as it is practical.

The Story of an Inventor. San Francisco. 1897.

This is a reprint of an article which first appeared in the *Overland Monthly* in February of the present year. It is an account of the life and struggles of Mr. A. B. Bowers, an inventor and litigant. To anyone who has an experience of invention in America, it might be perhaps unnecessary to add the last two words. For if an inventor in the States be ingenious enough to invent things of commercial value, his time will, for the rest of his life, be one interminable and hopeless struggle in the courts of law. Mr. Bowers will go down to posterity as the inventor of a very ingenious and useful system of dredging. The principle on which he worked is somewhat like that which has been so successful in the hands of the Mersey Docks and Harbour Board in their attack on Liverpool bar. But whereas at Liverpool only a vast accumulation of sand has to be dealt with, this invention is prepared to deal with much more consistent substances. Moreover, the disposal of the soil is effected differently in each case. The Mersey dredger, when its hoppers are full, goes out to sea to empty them, whilst the Bower dredger remains on the spot and disposes of what it brings up as soon as it gets hold of it. The two systems, in fact, are each excellent adaptations of the means to the end. But in each there is the fundamental idea of what we may call hydraulic dredging. In the Bowers' system an enclosed wheel revolves and cuts away the bed which is under attack. The spoil is then treated with water until it is sufficiently liquid to be capable of being dealt with by centrifugal pumps. The dilution in some cases requires the addition of as much as 70 per cent. of water. Then it passes direct from the discharge, through a line of pipes, to a place where it is desired that it shall be deposited. Thus it is possible to make an embankment with the spoil as it is won. So much for Mr. Bowers' invention, which has done much for many harbours on the western slope. We must leave the pamphlet itself to speak of the hardships and troubles which have awaited him at every turn, and any of which might well have discouraged an ordinary man. Suffice it to say that the whole story shows how undesirable is the legal system which prevails in America. Litigation is prolonged and becomes interminable. No one can tell when a case is finally disposed of. The multiplicity of appeals and the refined technicalities of the law are inimical to business. Lastly, the pictures of commercial morality on the Pacific shores are not attractive, and, we trust, are exaggerated. The book is full of illustrations, and these are of the high standard always maintained in American publications.

A Table of the Principal Stars, with directions for recognising them. By Lieut. C. G. Benton, R.N. Southampton: John Adams & Co. Price 2s.

This little table has evidently been the result of a good deal of thought and labour on the part of Captain Benton. Each star tabulated is given under its proper constellation. Its magnitude is noted and its constellation letter shown. Its bearings and its distance in degrees from certain other important stars are given, and in addition, in many instances, a means of checking the accuracy of the results obtained by such observations is afforded by foot notes, which show that such-and-such stars from such-and-such mathematical figures is in conjunction with such-and-such other stars. The whole table is mounted on linen, so as to be untearable and easy of reference. It will certainly prove of use to those who are studying astronomy, especially if they are without teachers, and will also prove a valuable check upon their operations to those who make observations of stars for the purposes of navigation.

A Manual of Elementary Seamanship. By D. Wilson Barker. London: Chas. Griffin & Co. 1896.

This is another of the useful Nautical series. We have already noticed several of the series, including one work by the present author. He now desires to fill a space in the Nautical Library by giving to the public a manual of seamanship which shall meet the needs of apprentices and junior officers in the Mercantile Marine, being in fact somewhat more elementary than the works on the subject already before the public. No man is better fitted for such a task as he has set himself here than Capt. Wilson Barker. He begins his subject by a brief description of the construction and parts of the vessel's hull. Then he touches on the rigging and proceeds to a few remarks on Boating. Here he opens with an excellent remark which may be taken to heart by all who go to sea. He says, "A sailor should take every opportunity of thoroughly mastering all boating details at sea; as a rule, he has no chance of acquiring such knowledge. Boats are then only used in cases of accident when ignorance in their manipulation may have serious consequences." In such emergencies men are not restricted to the work of their proper departments, and so the word "sailor" may here be taken in a very wide sense. The work of the old-fashioned sailor who knew his knots and splicing and had to handle vessels with hemp standing rigging and to send down yards and topmasts on

occasion, is gone into with the aid of many excellent illustrations. Advice is given as to the handling of boats, as to the restoration of the apparently drowned, as to what should be done under various cases of difficulty, and as to the wisest procedure when the cry of "Man overboard!" is raised. A large part of the book is given up to the discussion of the rule of the road at sea and as to sound signals, whilst a useful list of nautical expressions is also given. Thus it will be seen that while the volume before us does not attempt to teach the duties of officers and those who are in charge of the navigation of the vessel, it tends to make a thorough seaman of a lad. It grounds him in the elements which are too often neglected now-a-days and without which no one can be a thorough seaman, or be capable of doing the best thing possible in those sudden emergencies which are wont to overtake even the best constructed most modern vessels at sea.

Notes and Wrinkles for Apprentice Engineers. By Thomas Wallace. London: Geo. Philip & Son. 1897.

Mr. Wallace has desired in this little book to repair some of the omissions in the education of our younger engineers who, owing to the special nature of the profession, do not get the opportunity of thoroughly mastering every branch of their work during their apprenticeship. It has been borne in upon the author that a considerable number of young men, trained in repairing shops, never have an opportunity of seeing a set of marine engines erected, and the present work is designed to supply, as far as possible, this omission. In a practical way and in language which is suited to the occasion, being perfectly clear and natural, without any attempt to talk over the heads of his students, Mr. Wallace traces the operation of erecting the engine from the time when the bed-plate is landed in the pit in the erecting shop. Every point of difficulty is eased by illustrations of a rough but exceedingly explicit type. The book is thorough and practical, and will certainly be of great value to the class for whose use it is designed.

Miscellaneous.

Catalogue.—From Messrs. Shanks & Co., of Tubal Works, Barr Head, near Glasgow, we have received a handsomely got up catalogue of the sanitary appliances for ships' use, of which they make a speciality. The catalogue is fully illustrated, and the drawings show the internal details of the appliances as well as their general external appearance. The drawings are accompanied by details as to sizes and extras, and prices, and each size has its own reference number, for convenience in ordering from the catalogue. The firm offers most ingenious and elaborate arrangements for sanitary conveniences, baths, washstands and heating apparatus for high-class passenger steamers and large yachts, where space is no great consideration when luxurious conveniences can be given to passengers. But this class of work is not the only one regarded. There are cheap but very efficient types for the use of the steerage passenger and the seaman. Indeed, throughout, the prices seem to be cut as low as is consistent with the good material and workmanship which are essential to enduring and satisfactory wear. Another class of work to which Messrs. Shanks & Co. seem to have devoted peculiar attention is the designing and manufacture of folding appliances for use in yachts and such-like vessels, where space is an object, and where it may be desirable to prevent the object of the fitting being too apparent from its external appearance when not in use. Shipbuilders and designers, as well as those who contemplate ordering vessels, may very usefully refer to this volume.

Catalogue.—From the Worthington Pump Co., whose chief office is in Queen Victoria Street, E.C., we have received a copy of their new 1897 catalogue. It is four years since the issue of the last edition of their price lists. Meanwhile, as is likely with such a firm, things have not stood still. The capacity of the works has been increased, and they are now capable of giving an output of as many as 1,200 pumps per mensem. Of course the added experience has given improvements in design, and chief amongst these is a new valve motion which will tend towards increased efficiency and even longer life to their pumps. It is hardly necessary to remind our readers that this firm designs it, with the standard sizes, and that the parts are interchangeable. The present catalogue, like its predecessor, is fully illustrated and has code words for the various type and sizes of appliances catalogued, as well as a telegraphic code, so that orders by letter or telegraph can be given with the maximum of accuracy and the minimum of trouble and expense. More standard classes and sizes are given here, but larger pumps, specially suited for special classes of work, such as dealing with sewage or for waterworks installations, can also be specified for if desired. Perhaps the firm is best known, by marine engineers at all events, for their specialities for use at sea. Mining and hydraulic work is of somewhat the same class. But besides these, the firm makes feed water heaters, condensers, water meters, and a large number of other appliances, more or less nearly connected with their main work. To marine engineers and shipbuilders the new issue of this standard catalogue will be heartily welcome.

The Flensburg Shipbuilding Company, of Flensburg, has celebrated its 25th birthday, which occurred on the 3rd July of the present year, by the publication of a very handsomely got up volume. Those who have been charged with the direction of this concern may well look with pride upon their history. They began, like most successful men, in a small and unambitious way. Their first year's output amounted to but 2,800 tons. The following period of five years did not even sustain this amount as an average. It only totted up to 4,800 tons altogether. But in the next period it had almost doubled. And so increase has followed increase till in the year 1896 alone the output amounted to nearly 18,000 tons. Altogether we find that the company has turned out some 168 vessels of about 220 tons gross register, and of about 97,000 H.P., and its customers include the most important firms in the country. It has built vessels of upwards of 5,000 tons gross register, and of about 3,000 I.H.P. It is needless, perhaps, to add to this the fact that its appliances are of the first order and are capable of dealing with the largest and heaviest masses. They include a large floating dock of British manufacture, and there is a 100-ton crane in the yard. Generally, it may be said that if the Flensburg Co. is justly proud of its record, Germany may well be proud of the Flensburg Co.

The Royal Belgian Mail Route.—A new steamer, the *Princess Clementine*, has recently taken her place in the Dover-Ostend service. She has a speed of 22 2·10 knots per hour, viz., the same speed as the *Marie Henriette* of the same service, which vessel has the distinction of being the fastest paddle steamer afloat. The *Princess Clementine*—whose total length is 352 ft., and breadth outside the paddle boxes 78 ft.—is fitted with two rudders worked by steam, and possesses four promenade decks, on which from 600 to 700 passengers can easily be accommodated. The great reduction in the duration of the journey from London to the principal towns on the Continent is mainly due to the splendid fleet maintained by the Belgian Government. The train service has also undergone a great improvement, and the route, owing to its luxurious rolling stock, and the convenient inter-communications which it offers, secured the patronage of many of the foreign princes who recently came to London to attend the Jubilee celebrations of the Queen.

Shipbuilding at Hessle.—Mr. Henry Scarr (late of Beckside, Beverley), launched on July 16th, the first vessel, of 200 tons capacity, from his new yard at Haven Shipyard, Hessle, in the presence of some 2,500 or 3,000 spectators, who witnessed a ceremony such as has not taken place in Hessle for nearly 100 years. The new vessel was christened the *Kingston*, by Miss Ford, daughter of the owner. Mr. Scarr, in March last, secured the present site, upon which he has erected commodious and extensive workshops, &c., to enable him to cope with the increasing orders with which his firm had been entrusted.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from June 9th, to July 6th, 1897.

14045 E. Reilly and F. W. Fisher. Boat launching.
14060 E. Partington. Engines.
14078 H. J. Chart. Propulsion of vessels.
14092 H. R. J. Portieur. Engines.
14107 D. Morgan. Rotary engines and pumps.
14150 W. W. Beaumont and H. P. Holt. Steam generators.
14165 C. Barnes. Internal combustion engines.
14172 J. Seguy. Steam boilers.
14191 S. E. Snedeker. Steam generators.
14213 E. Hall-Brown. Screw propellers.

14220 A. F. Scott. Steam pressure engines.
14224 W. Wood. Buoy for fishing purposes.
14226 L. Lewis. Preventing boiler incrustation.
14248 F. W. Reynolds, jun. Governors for engines.
14291 H. Cameron and J. M. Malloch. Corliss valves.
14362 W. F. Morris. Boats propelled by side paddles.
14363 H. Cawallin. Superheating of feed-water.
14470 E. Parsons. Valve for steam engines.
14479 H. E. Newton. (C. C. Worthington, United States.) Steam pumps.
14561 G. Pickhardt. Covers for steam boilers.
14562 T. B. Sharp and F. Billing. Steel tubes.
14574 L. Spring and G. Hallatt. Trawl fishing.
14585 M. H. C. Shann. Internal combustion engines.
14605 G. H. Zeal. Electric indicator for ships..
14609 G. F. Tippett. Hose for pump dredgers.
14641 D. B. Morison. Engine condensers.
14686 A. P. Jones. (The Société Anonyme due Temple, France.) Boilers.
14757 G. H. Firth. Governors for steam engines.
14767 G. W. Hawksley. Flues of steam boilers.
14777 S. Boardman. Packing for piston-rods.
14780 W. A. P. Werner. Steam generators.
14796 J. I. Booker. Rolling conical corrugated flues.
14797 J. I. Booker. Fire-boxes for steam boilers.
14805 E. Baggstrom, W. P. Guthridge, and A. E. Langley. Propeller blade.
14847 W. H. and R. Thompson. Steam traps.
14851 S. Naylor and R. Steel. Packing engine pistons.
14903 F. R. Jardine. Rudder.
14922 C. Ferrand. Steam generators.
14956 R. Wright. Lubricators for engines.
14958 C. Laurence and F. W. Fisher. Otter boards of trawling nets.
14959 F. W. Fisher and E. Reilly. Otter boards for trawling nets.
15004 E. B. Thorburn. Governors for steam engines.
15027 J. Reid. Engine cylinder steam traps.
15069 L. M. Hakansson. Steam engines.
15097 J. Lones and E. Holden. Boat rowing.
15127 H. Consterdine. Yachts.
15143 J. Willoughby. Apparatus for superheating steam.
15148 P. J. Livsey. (J. Riekie, India). Steam engines.
15165 J. P. O'Donnell. Engineers' black pins.
15167 J. King. Apparatus for heating feed-water.
15177 A. M. Gallet. Fishing-boats' mast headlight.
15183 R. H. Isbell. Compound rotary engines.
15227 W. H. Ellam. Three men in a boat.
15240 W. Matthews, G. F. Tippett, and W. Wingate. Dredgers.
15285 T. B. Sharp. Manufacture of steel tubes.
15305 A. Robertson. Rudders.
15334 J. Moyes. Engines.
15348 F. R. Simms. Exhaust valves of engines.
15403 J. Ede. Combustion engine for boats.
15444 W. B. Johnson. (J. Purves, United States.) Valves.
15449 R. Cockburn. Valves.
15507 R. T. Blackburn. Ships' signal lamps.
15508 R. Haddan. (E. P. Watson, United States.) Water-tube boilers.
15527 E. Howl. Fittings for steam boilers.
15571 J. Dickinson and H. Page. Feed-water heaters.
15574 E. Edwards. (P. Michelson, Russia.) Steam boiler tubes.
15651 L. Coiseau. Dredgers.
10755 A. E. Bromell. Scraper for boiler tubes.
15774 J. I. Booker. Construction of boats.
15812 J. Woodward. Wrenches.
65861 A. H. Baird. Collapsible berths for ships.
15862 A. H. Baird. Collapsible berths for ships.
15886 H. Smethurst. Fishing trawl nets.
15914 J. H. Rosenthal. Water-tube generators.
15953 J. Weir. Boilers.
15955 J., A., and H. E. Northup. Centre boards.
15968 F. A. Robinson. Centrifugal pumps.
15975 P. McMillan and L. L. Allen. Armour-plates.
15983 E. Uhlenhuth. Internal combustion engines.
16003 J. H. Smith. (J. J. Mann, France.) Tubular boilers.
11020 H. E. Metcalf. Steam generators.
11028 A. F. E. Dupont. Steam generators.
11639 C. R. S. J. Hallé. Steamship construction.

BOARD OF TRADE EXAMINA' ONS.

NOTE.—1C denotes First Class; 2C, Second Class.

June 19th, 1897.

Blay, G. F.	2C	S'ham'ton
Brooke, O. G.	2C	Cardiff
Browne, L.H.M.	2C	London
Cromwell, J. W.	1C	Glasgow
Davies, Thomas	1C	Liverpool
Downie, Arthur	2C	,,
Fleming, J. D. S.	2C	Glasgow
Fletcher, H. T.	1C	,,
Frazer, J. E.	2C	Cardiff
Frew, W.	2C	Glasgow
Haines, C.E.C.	1C	Liverpool
Hall, C.	2C	Cardiff
Hall, H.	2C	W.H'pool
Hill, H. W.	2C	,,
Howell, S. W.	1C	Cardiff
Howie, A J.	2C	Glasgow
Jones, W. E.	2C	Cardiff
Lewis, E. F.	2C	London
Liddiard, A. A.	1C	Aberdeen
Macfarlane, F.	1C	,,
Madge, J. W.	2C	Cardiff
Mathias, W.	2C	London
Mawston, G.	2C	W.H'pool
McConnell, W.J.	2C	Glasgow
Meiklejohn, A.A.	2C	Aberdeen
Mitchell, J. J.	2C	W.H'pool
Moore, C. E.	2C	Cardiff
Nixon, J. E.	1C	W.H'pool
Page, L. G.	2C	London
Pollock, M.McC.	1C	Cardiff
Reid, J. R.	1C	,,
Rungeling, T. A.	1C	Liverpool
Simpson, H.	2C	W.H'pool
Todd, H. M.	2C	Aberdeen
Towler, F. H.	2C	Cardiff
Vine, G. A.	2C	,,
Watson, C.	2C	W.H'pool
Watson, W E.	2C	,,
Wilson, S. J.	2C	London

June 26th, 1897.

Allen, W. H. G.	2C	S'nd'land
Atherton, T. H.	2C	Hull
Atkins, G. W.	2C	London
Baston, J.	1C	N.Shields
Buck, J. H.	1C	London
Berry, Joseph S.	1C	Liverpool
Burdes, J.	2C	S'nd'land
Coates, E.	2C	N.Shields
Cranston, F.	2C	,,
Davidson, W.M.	1C	London
Doig, W. K.	1C	S'nd'land
Douglass, W. J.	2C	,,
Downs, C. S.	1C	London
Dreury, J.	2C	Hull
Fairman, S. C.	1C	S'nd'land
Furness, M. R.	2C	N.Shields
Graham, A.	2C	London
Hall, E. A.	1C	N.Shields
Hall, John J.	1C	Liverpool
Hughes, Owen	1C	,,
Humbert, H.	1C	London
Hunter, J. J.	2C	S'nd'land
Hutchinson, G.	1C	N.Shields
Ions, T. R.	1C	,,
Jones, Richard	2C	Liverpool
Kemp, James P.	2C	,,
Masters, H. H.	2C	,,
McNab, Peter.	1C	,,
Morrison, J. A.	1C	Hull
Oswald, J.	2C	N.Shields
Petty, H. W.	2C	London
Priestly, E.	1C	S'nd'land
Ramsay, John.	2C	Liverpool
Redford, T.	1C	,,
Reid, W.	2C	London
Richards, W. A.	2C	N.Shields
Robinson, T. J.	2C	S'nd'land
Sprunt, F. W.	2C	London
Timms, P. G.	1C	,,

July 3rd, 1897.

Aitken, D. R.	1C	Glasgow
Barclay, H.	2C	,,
Beresford, W. J.	2C	Cardiff
Bowie, D.	1C	Glasgow
Burns, R.	1C	,,
Cameron, H. O.	1C	Cardiff
Collins, F. A.	1C	Liverpool
Coodes, H. A.	1C	Cardiff
Corbett, A. J.	2C	Glasgow
Derrick, W.	1C	London
Ferrier, J. P. L.	1C	Glasgow
Finlayson, A.	1C	,,
Gamble, T. K.	2C	Liverpool
Godkin, Arthur	2C	,,
Jamieson, J.	2C	Glasgow
Jones, D. J.	2C	Cardiff
Leggett, W. B.	2C	Glasgow
McArthur, W.C.	1C	,,
McLullich, J. D.	1C	Cardiff
Menzies, J. M.	2C	Glasgow
Nielson, W. M.	2C	,,
Paulesen, J. C.	2C	,,
Payne, J.	1C	Cardiff
Pool, F.	2C	,,
Scott, Andrew.	2C	Liverpool
Shephard, W.H.	2C	London
Smith, D. H.	1C	,,
Spencer, W.	1C	Cardiff
Stephens, C. D.	1C	,,
Thomas, R. P.	2C	Liverpool
Tucker, H. J. T.	1C	London
Wallace, J. B.	2C	Glasgow
Watson, A.	1C	,,
Wilson, Samuel	1C	Liverpool

July 10th, 1897.

Andrews, P. B.	2C	Liverpool
Blackett, J. S.	1C	London
Blanshard, W.D.	1C	,,
Botcherby, B.	1C	N.Shields
Chadwick, J. M.	2C	Liverpool
Clay, James R.	1C	,,
Couper, J. S.	1C	Leith
Evans, J. J.	2C	N.Shields
Garden, R.	2C	Leith
Graddon, E. E.	1C	London
Greig, G. M.	1C	N.Shields
Hall, John H.	1C	Liverpool
Harrison, J. B.	1C	,,
Kennedy, James	2C	,,
Longstaff, T. W.	2C	N.Shields
Martin, Andrew	2C	Liverpool
Norris, H. W.	2C	,,
Petersen, C.	1C	N.Shields
Richards, J. A.	2C	London
Robinson, G. A.	2C	N.Shields
Robinson, T.	1C	Liverpool
Thornley, T. W.	2C	London

Water Tube Boilers.—The Swedish Government have selected the Yarrow type of water-tube boilers for adoption in their most recent torpedo boats, which are being constructed at Stockholm.

The Marine Engineer.

LONDON, SEPTEMBER 1, 1897.

AN extraordinary anomaly in the position of the United States as a naval power is that arrangements have been made for the docking and repairing of three of the largest battleships of the United States Navy at Halifax, Nova Scotia. It would appear that there is no sufficient dock accommodation in any naval station in the States. This neglect of their naval interests is on a par with their neglect of their Commercial Marine in the last forty years. The neglect of their naval and marine interests is the more remarkable when we view their rapid progress in other industries, such as steel productions, in which they are now 1,000,000 tons in excess of our productions, notwithstanding the fact that last year our own productions showed an increase of 550,500 tons. Forty years ago the American liner and clipper was a model for the world. The passages made by the tea and silk American clippers distanced all competitors, and established records in navigation which have never been beaten. Probably the Civil War and the damage done by the *Alabama* and Confederate cruisers struck the most serious blow to American shipping interests, and the carrying trade was diverted into other bottoms, chiefly British. The high prices of labour maintained by protective tariffs, and the high cost of imported material, have both served to restrict further enterprise in shipbuilding; but the marvel is that now that the States are a steel and iron producing country on a large scale, the shipbuilding interest has not been revived, since in foreign markets the States, especially in Japan, are underselling both England and Germany. The prices taken for such foreign contracts are, however, no criterion of the cost of production, but is the result of the peculiar method of production adopted in the States. They produce large stocks of manufactured goods in anticipation of orders. The price of the home market is kept up by protective tariffs, and the balance unsaleable at home has to be realised abroad at any prices they can get, the loss on the foreign sales being set off against the high prices obtained at home. In this way cost of shipbuilding in the States is maintained at a very high figure, and the carrying trade is left in British hands. As regards naval development it is a non-productive department, and in the embarrassment of the public revenue, is not likely to be quickly developed, and it can only be the extreme confidence of the United States as to its immunity from foreign attacks, or their reliance upon retaining the friendship of Great Britain under any circumstances, that would permit her statesmen to so neglect the primary conditions of safety, as regarded from a British or Continental point of view, that they would be dependent upon our dock accommodation for the repair of their battleships.

WE have arrived at an era in steamship building at which the means of propulsion through water will require reconsideration and probably considerable revision. We refer to the screw-propeller now so universally used for propulsion both in the Mercantile Marine and in the Navy. Piston speeds and revolutions per minute are rapidly rising with the higher steam pressures carried, and with the necessity before us in competition to get the greatest possible work out of the least amount of deadweight. In addition to this the late success of the rotary turbine motor in the *Turbinia* has shown that efforts will probably be made to adopt rotary motors to a much greater extent in high speed boats, such as torpedo-boats or destroyers. In such case the speeds of revolution of the propeller will be such as have never yet been contemplated or experienced. The high velocities of modern high-pressure engines develop also a new disadvantage in the serious and racking vibration of the hulls. This is even already most disagreeably noticeable in the latest high-speed Channel boats, and such vibration must be greatly lessened or avoided to render such boats comfortable or acceptable to passengers. Though, no doubt, a large proportion of this vibration is due to the reciprocating action of the engines, we believe it to be greatly accentuated by the present form of propellers, which may be all that could be desired for ordinary rates of revolution, but which are both inefficient as propellers and a fruitful source of vibration to the hulls at the high speed of revolution now being thrust upon us. In our opinion the distribution of the effort of propulsion upon a greater number of blades of relatively smaller area than those of the ordinary propeller will be a line of investigation that will repay experiment and invention; and it is now being generally recognized that the excessive speeds of rotation required from screw propellers have to a great extent upset the usually received formulæ as to pitch, blades, and area of blades, and that formerly accepted data are no longer applicable to modern altered conditions.

OUR destroyers have been considerably in the wars lately. No less than four have come to grief in one way or another between the 12th and 20th of last month. The gales and heavy weather that have prevailed during the past month have no doubt something to do with this, but it would appear that there

is some latent source of mischief not yet quite realized by their officers and crew tending to produce so thick a crop of disasters. The last accident was the collision of the *Thrasher* and the *Phæton*. The destroyer, it would appear, got across the bows of the *Phæton*, and the whole of the port side is more or less damaged. The funnel and mast are twisted out of shape, and the boat presents a sorry appearance. It would appear that there was a stiff south-westerly gale blowing with a heavy sea, and the *Thrasher* was consequently ordered to come up under the lee of the *Phæton* for protection with the consequence recited of a collision. Now we would remark that in our opinion there is too little recognition amongst naval commanders of the enormous attraction of the present heavy ironclads to one another by reason of their mass, or of a large iron vessel for a smaller one. The phenomenon is well known, that where a series of chips are floating together on the surface of water they will tend to approach until in contact with one another. How much more must be the attraction of the heavy ironclads to one another when in proximity, or of a large iron vessel to a smaller one, since such attraction is proportional to the mass. A small vessel such as a destroyer tossing in a sea-way in proximity to the relatively enormous mass of an ironclad is sure gradually to be drawn by the enormous adjacent mass until it comes into collision with it, and the destroyers are of such fragile hulls, that such a contact is sure to produce a serious disaster upon the lighter hull. The ultimate collision of the mutually attracted masses will probably take place suddenly and unexpectedly at the last, when the proximity has become very close, for the relative attraction increases inversely as the square of the distance. That is, assuming a certain attraction to exist when the vessels are 6 ft. apart, that attraction will be quadrupled where the vessels are only a yard apart. Beyond this relative attraction of mere masses, it is well known that iron and steel vessels become magnetic by polarisation, and there is therefore the possible added attraction of unlike magnetic poles in the adjacent hulls. New developments in structure and material constantly present new problems fer consideration, and there is still much to learn as to the peculiarities and handling of our ironclad fleet.

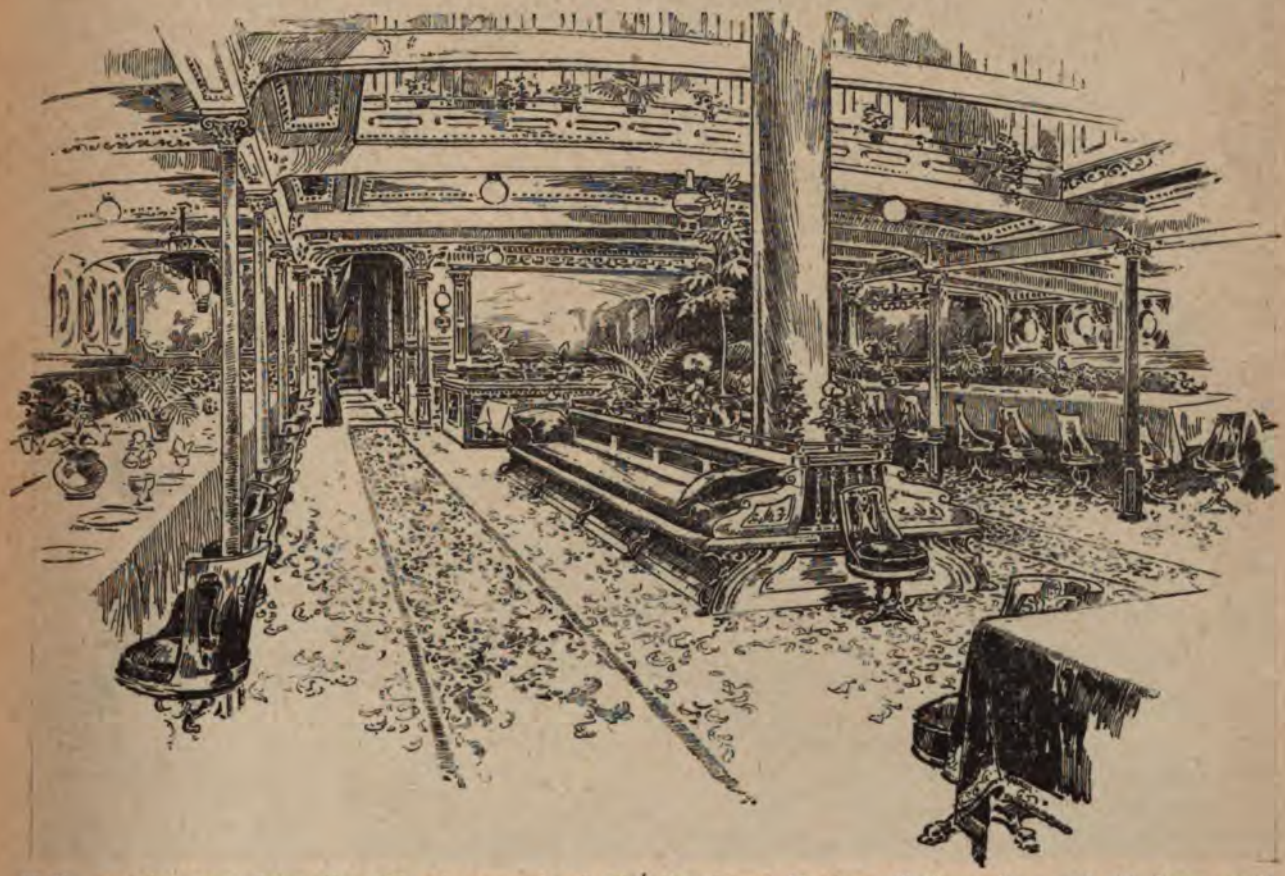
THERE is a scheme on foot to still further shorten the passage between Great Britain and the United States. The project comes this time from our Canadian brothers, who suggest the shortening of the time occupied on the Atlantic sea voyage to four days from Liverpool to St. John's, which is a British port, and one of the finest harbours in the world, and is open all the year round both winter and summer. It is said also that this northern route will enable the liners to avoid the heavy fogs which are met further south. From St. John's a railway line is already nearly completed across Newfoundland to Port aux Basques, near Cape Ray, which will give a run of 24 hours to Cape Ray. Then a steam ferry boat is being built, which will make the passage from Cape Ray to Cape Breton across the Cabot Strait in four hours, and from Cape Breton, passengers can make a run to New York in 30 hours by the Inter-Colonial Railway, thus completing the journey from Liverpool to New York in a little over six days. We fear, however, to many the longer voyage in the palatial liners would be preferable to the 2½ days' railway travelling with the annoyance of the constant changes, much as we would wish success to the scheme of our enterprising colonials. For Montreal or Quebec, however, this would be a rapid route, and we should like to see a rival line established for this service, which might compete, where shortest time was a necessity, or amongst those who quit the sea as quickly as possible, with the present sea-mail routes to New York.

THE GREAT EASTERN RAILWAY CO.'S STEAMER "DRESDEN."

AT the great Naval Review at Spithead, in June, one of the smartest and most noticeable amongst the channel steamers assembled was the *Dresden*. Those who regard the sketch which we give of her in the present issue will not be surprised at the attention she attracted. She is the ninth of the important twin-screw vessels built for the Great Eastern Co.'s Continental services. All these ships have been built and engined by Earl's Shipbuilding Co., at Hull. They therefore boast a very satisfactory similarity in their general design, though, of course, as time passes, size, power, speed and comfort are all largely increased as experience and confidence in policy are acquired. The first pair of these vessels were launched in 1883, and were of the length of 280 ft., their gross tonnage being between 1,000 and 1,100 tons. Then came another pair, 20 ft. longer, and 100 tons larger. The fifth vessel was the *Chelmsford*, of a length of 300 ft. with 34 ft. beam. Her tonnage exceeded 1,600 gross. This was in 1893. Encouraged by her success, three more steamers of about her length, but of 2 ft. more beam, and of upwards of 1,700 tons gross register, were added to the fleet, and now comes the *Dresden*, again a couple of feet beamier, though her engines are similar to those of her immediate predecessors. She was launched on the 17th November, 1896, and is of a register tonnage of 1,805 gross, and 496 net. She has a straight stem and an elliptical stern. She has two slight masts, schooner rigged. The deck arrangements followed are those of the best Atlantic practice, of course on a small scale, for the vessel has a long forecastle, poop, and bridge deck 218 ft. long amid-

ships, which is kept as a promenade for first-class passengers. This is protected by a permanent wooden awning deck, above which are carried eight boats. Forward in the 'tween decks arrangements have been made for the carriage of horses. Every facility that experience can suggest for the rapid handling of the passengers' baggage, and of the small quantity of cargo for which there can be accommodation in a fast passenger ship, has been adopted. For this end derricks are fitted to each mast, and the vessel carries three deck winches. The engines are of the ordinary inverted triple-expansion type, each set driving its own screw, and having three cylinders of a diameter of 26 in., 39½ in., and 63 in., respectively. The stroke is 36 in. The engines indicated together about 5,000 H.P. on trial, and drive the ship at upwards of 18 knots. Steam is supplied by five large boilers, of which it is said, any one would, in case of partial disablement of the vessel, supply enough steam to drive the ship at 10 knots. The vessel is, of course, fitted with electric light. The question of ventilation has had considerable attention, and ventilating fans are fitted both in machinery and passenger departments. She has water ballast, and is fitted throughout the passenger and crew space with steam coils for heating purposes. But the passenger accommodation is what particularly calls for our attention. She has room for 226 passengers in the first-class. The arrangement and decoration of the main saloon is shown by one of our illustrations. This room is on the bridge deck, together with some of the state-rooms and with the "distinguished strangers'" rooms. Here, too, are the ladies' room, the smoke-room, lavatories, etc., as well as officers' accommodation. The remainder of the first-class state-rooms are below, but all forward of the machinery space. The second-class passengers are carried aft of the engine-room, where there is accommodation for about 120 of this class.

When one regards these vessels, which carry on so excellent a service, and have so great a reputation for immunity from accident, even of a minor kind, it cannot but be a matter of regret that foreign lines with vessels of an antiquated paddle type—which could not be commercially possible if it were not for their subsidies—are given the great bulk of the mails. But the Great Eastern Railway does not sit down and call upon the gods to assist it. It goes on building up its business, and improving its vessels and its land connections, opening new lines (such as that to the Hook of Holland), and generally making so many friends, and such a record that in time it will claim the mails as of right.



New Dry Dock for Swansea.—A new dry dock with which the trustees of the late Mr. Walker have decided to proceed at Swansea, is to be between 400 ft. and 500 ft. in length and 55 ft. in breadth, and it will accommodate the newest type of vessels.

The Flensburg Shipbuilding Company, in Flensburg, in the Duchy of Sleswick, is at present fully employed. They are building three large Transatlantic steamers for Copenhagen account and another large boat for the same town.

CRANK AND OTHER SHAFTS USED IN THE MERCANTILE MARINE.*

By G. W. MANUEL, Esq., R.N.R., Member.

I HAVE selected this subject, as the failure and breakage of shafting in the Mercantile Marine, though not so frequent, still goes on, as recorded by the daily papers, causing loss and detention to the shipowner and anxiety to all concerned.

While bringing before you the cause of some of these failures, I take this opportunity of getting the experience of those of our foreign colleagues now visiting us, on this important matter.

Papers have been read and discussed, here and elsewhere, connected with this subject, chiefly dealing with the calculations relating to the twisting and bending moments, effects of the angles of cranks, &c.

The Great Eastern Railway Co.'s Steamer "Dresden." (*See page* 206.)

It is not my intention to trouble you with calcuations on this, your Jubilee trip, but rather to give you the results of experience of the working of these shafts, under the calculations already made for us by the Board of Trade and Lloyd's Register of Shipping, which govern the minimum dimensions of all these shafts in the Mercantile Marine of this country, and some of the causes of the breakage of these shafts.

I will begin by allowing that all shafts fitted in new steamers are likely to be in line, and fair with one another from crank to propeller shaft, when the completion of coupling-up is done after the steamer is launched and is water-borne, therefore I do not take fitting of this description into account.

After the bearings are adjusted, engines set to work, the voyage begins, and the power to give the required full speed exerted, then, owing to insufficient bearing surface, the oil for lubrication gets squeezed out, and the metal of the shaft and bearings gets too close together, causing excessive friction; hot bearings commence, and it may be one or two bearing nuts are slacked back, and salt water, as well as oil, used for the rest of the voyage, causing the bearings to get rough, the shaft is strained by alternate bending, heating, and cooling suddenly, and, when continued, it gets out of line; fractures begin, until the shaft breaks at sea, or has to be taken out on arrival in port.

I have known the crank pin bearings, under these circumstances, require renewal after a voyage of only 6,000 miles, in spite of many gallons of oil wasted, and the main bearings require to be lined up after running half that distance.

The failure in this case is due to the engine-builder, who also may have had pressure put on by the owner to get the engines into as little space and made as light as possible, added to the rivalry due to competition with other builders.

Shaft Bearings Getting Hot.

Allowing that the bearing surfaces are of good proportion, damage to shafts occurs from want of proper lubrication, or dirt and grit getting into the bearings, and the engine not being slowed down or stopped in time, before the heat becomes excessive so as to melt the bearing metal. Cold sea water is suddenly applied while the surface of the shaft is expanded by heat, causing surface flaws to commence by sudden contraction locally, or hidden flaws to open out, especially where the shaft is made of non-homogeneous material, which may eventually cause it to give way, or to be renewed in harbour. Figs. 1, 2, and 8 show some hidden flaws come to the surface.

The failure in this case is primarily due to want of judgment, or neglect on the part of the engineer or men in charge.

* Read at the International Congress of Naval Architects and Marine Engineers, at the Imperial Institute, Sir Nathaniel Barnaby in the chair.

Unequal Loading of Cargo.

It has sometimes occurred when loading vacant parts of holds adjacent to the engines, that hundreds of tons of metal blocks or bars have been put in a short space, with ordinary light cargo in same hold; the steamer's hull becomes locally deflected with such treatment, also the shaft, and under the influence of heavy weather combined, the shaft is strained and flaws commence, ending as before.

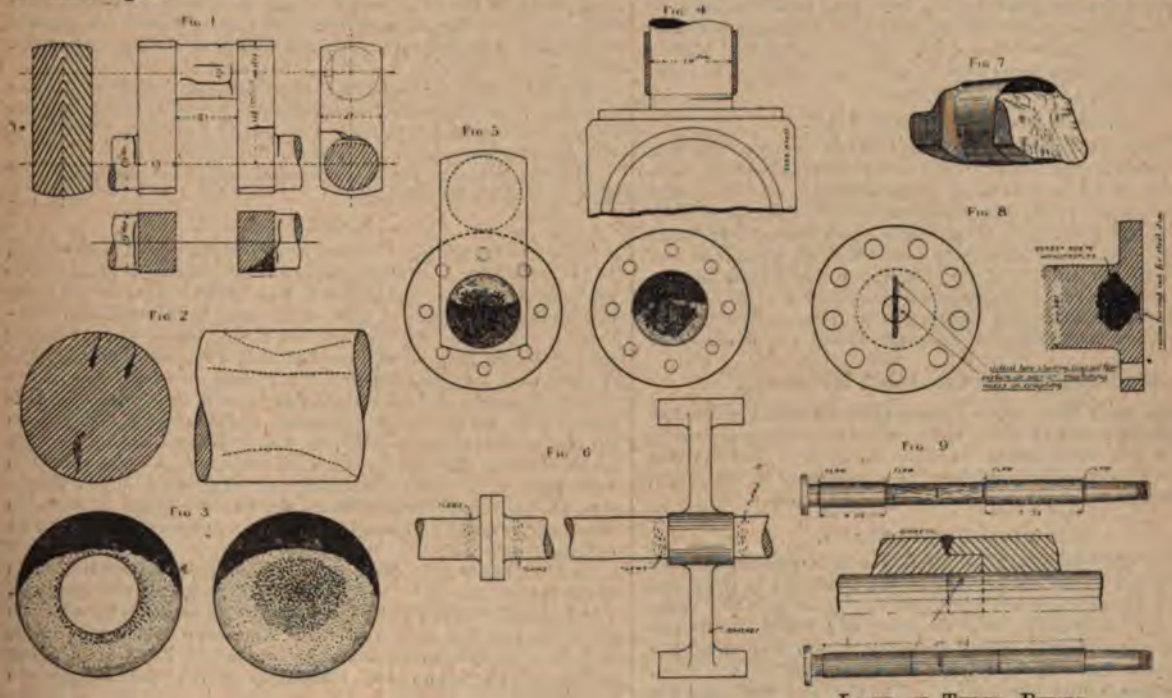
This failure is due to want of consideration by those in charge of the stowage of the vessel.

I would here mention that weak engine seatings, defective bearings, brittle steel bed-plates and framings supporting the engines, have caused the breakage and failure of shafts.

These latter failures are due to ship and engine builders' designs.

Twin-Screw Steamers.

It is well known that engines in these steamers, originally designed to lessen the danger of accident, have not lessened the breakages of their shafts, though they have been able, after the shaft of one engine has given way, to make up their port with the other engine.



I refer more particularly to the large class of ocean steamers and also smaller class, both having large H.P.

In some cases the shafts have been insufficiently supported by the ship's hull, at a considerable distance from the centre of the vessel transversely, their bearings far apart, and the screw-shaft unprotected and exposed to shocks of the sea in bad weather, added to the continual strains due to vibration of the ships themselves, which is in some cases considerable, causing alternate elongation and compression in the direction of the length of the shaft, and creating flaws on the surface circumferentially close to couplings and bearings, that eventually cause the destruction of the shaft. (Fig. 6.)

These failures are due to inefficient design of hull and bearings at the stern part of the vessel.

Hollow Shafts.

Hollow crank and screw shafts have been seldom used in ocean-going steamers of the Mercantile Marine; and except a test hole bored in the centre of steel shafts forged from the ingot, to ascertain if there is any cavity in the centre, or what is termed piping, which hole does not exceed 2½ in. diameter in large shafts, made by the manufacturer, these shafts are generally solid shafts. Shafts generally give way from flaws near the surface, and would give way earlier at sea if they were hollow and not supported by the metal next the centre. I have seen several solid shafts with serious flaws extending inwards 3 in. from the circumference bring the vessel full speed into port, whereas if made hollow they would have broken at sea. In cases where some hollow shafts were used they gave out at sea. (Fig. 3.) This was a screw shaft found flawed in dry dock, which I eventually had broken.

Failures in these cases are through design.

Where improvements have been made to remedy the defects I have mentioned, ocean-going steamers are now driven at full speed on a voyage of 12,000 miles with no salt water on the bearings for years, and free from mishaps.

I may here say that the use of triple and quadruple engines, by reducing vibration as compared with the irregular motion of the two-crank engines, tends to increase the life of these shafts, and that part of the power formerly wasted in vibrating the vessel is now utilised in propelling it—balancing engines lends to prolong the duration of shafts.

In spite of all these improvements relating to design, there remains the serious question of defective and variety of quality of the material which these shafts are composed of, and many

Liner in Three Pieces

Liner in One Piece.

have given way at sea, and also been condemned, through no other cause than original defects in material and process of construction. (Figs. 1, 2, 5, and 8.)

Shafts made of Iron.

Iron is now less used, especially for crank shafts; steel is gradually taking its place in ocean-going steamers, except for propeller shafts.

Iron shafts are, I may say, made up of thousands of small pieces of selected iron, generally termed scrap, cuttings of old iron boiler plates, good navy ship iron, cuttings off forgings, old bolts, horse-shoes, angle iron, all welded together, forged into billets, re-heated and rolled into bars, cut into lengths, and formed into slabs of suitable size for welding up into the shaft. Before the use of steel generally considerable improvement on the old method of faggoting, so-called, has been made, more powerful forging hammers used, along with more suitable fur-

naces and fuel; still, with all this care, I may say there is not an iron shaft without flaws or defects more or less, and when these flaws became placed during the construction of the shaft, in proximity to the greatest strain, and though there was no hot bearing (which no doubt would have made matters worse), they often extended until the shaft became unseaworthy, and, after all, the best wrought iron that could be made of the finest scrap from the best qualities of selected brands, iron shafts are 60 per cent. inferior in strength to the best mild cast steel made on the open-hearth system, cast into ingots, and forged down under the hydraulic hammer or press. (Figs. 1, 2, 5, and 8.) Fig. 5 shows a section of the unwelded faggot bars, this shaft broke at sea.

Shafts made from Forged Steel Scrap.

After the introduction of mild steel for the construction of vessels there resulted an accumulation of cuttings from ships' plates, &c., and it was then considered desirable and economical to work this scrap steel into piston rods and shafts. But shafts made in this manner, though stronger than iron, as regards tensile strength, contained similar defects to that of iron, added to inequality of the material, in some parts hard, and in others soft; also being made up of thousands of pieces, some of different steels, and the presence of dirt, &c., along with the fact that steel requires more care in welding than wrought iron, the shafts and piston rods made in this manner were found inferior to that made of good homogeneous steel forged from the ingot, or even good wrought iron, and some gave way.

Shafts made from Cast Steel.

I may here state that in the P. & O. Co.'s service steel was used for crank shafts forged from the ingot as far back as 1863, then manufactured in Prussia by Messrs. Krupp, and generally known as Krupp's steel; the tensile strength was about forty tons per square inch, and, though free from flaws, they broke without warning. This steel was too brittle to withstand the strains of the engines, and its use was discontinued in the service and iron shafts again resorted to. (Fig. 7.)

Great improvements have been made by Messrs. Krupp since then, and I am informed that their shafts are now of excellent quality.

Shafts made from Cast Steel, Unforged.

Attempts have been made to manufacture crank and other shafts machined direct from the mould after being annealed. The result generally ended in failure, as the material was wanting in that ductility and toughness necessary in crank and other shafts, and I think they are now seldom used.

Mild Steel Forged Shafts.

The term mild steel applied to shafts in a general manner does not in my experience represent the condition of the shaft, for I have found there are very great differences in the value and quality of mild steel, even as much as I found in wrought iron, depending largely on the qualities of the iron used, the chemical and moulding operations of converting it into steel, also the amount and description of mechanical work applied when being forged into shafts. I attach a table showing these differences by actual test. (Tables I. and II.)

Mild steel was first used by the P. & O. Co. in 1880, the dimensions of the shafts were limited by the same rules as those for wrought iron shafts.*

The steel was made by the best makers, having a tensile strength of 24 tons per square inch, it being then considered inadvisable to exceed this limit on account of former experiences with high tensile steel. The shafts made were crank shafts, and are still running, have been in use seventeen years; up to the present date no flaws of any description have been seen. The engines have been tripled, using the same shafts and bearings, and the working power increased. The percentage above the Board of Trade and Lloyd's rules, which fix the minimum size, was 24 per cent.; a percentage above the rules must be allowed, and has been the experience of all shipowners, varying from their record of mishaps and losses, and condemnation of shafts by the surveyors of the Board of Trade and Lloyd's Registry.

Since these shafts were first used the tensile strength of mild steel has been gradually increased, and we are now using it at 32 tons per square inch, possessing equal, if not more, ductility and toughness, to endure even greater strains than formerly.

* Number of steel shafts in use in the company to present date 175, *chiefly cranks.*

This has been arrived at by continued improvement in the manufacture by the steel makers, so that the percentage allowed above the rules is gradually reduced to only 6 per cent., leaving a very slight margin (Table III.). I mention this as there is an opinion that the reason some shafts are so free from mishaps is owing to their dimensions being so much above the rules that regulate those sizes, instead of to the superior quality of the material used (Table II.). The table given shows the results of steel tests made from 1880 up to the present time, independent of that done by the Board of Trade and Lloyd's, which you will find interesting.

Propeller Shafts.

These shafts until lately have mostly been made of good wrought iron; steel, where it has been used, in stern tubes and outside, where exposed to the action of sea water, has in many instances been reduced in diameter in a very short time, and in some cases the shafts have given way, and in others had to be taken out through corrosion. Figs. 3, 4, and 9 show the usual position of flaws in these shafts.

There is no doubt that steel, when exposed to sea water, corrodes more rapidly than wrought iron. Where steel is used and protected from the action of sea water it can be used with advantage. Different methods have been adopted to protect the steel. I give you one which has been so far successful. (Fig. 9.)

The best method would be to make the gun-metal covering in one piece, but this is an achievement not yet reached in large marine engineering practice. I regret to state the breakage of these shafts have lately been on the increase.

Before explaining the diagrams and tables I would add a few words about nickel steel.

Nickel Steel.

This has been lately used for the construction of shafts, and, while possessing a higher tensile strength, about 40 tons, it also possesses increased ductility and toughness. But, as the price of this material is above that of the best mild steel, the shipowner would gain nothing by its use unless a corresponding reduction was allowed in the diameter, and, consequently, the weight of the shafts, for which purposes a modification of the Board of Trade and Lloyd's Rules would be desirable; this should only be granted on condition that a more severe test be applied than those at present, so that good and bad steels may be more easily distinguished. I do not wish to undervalue the tests early instituted by the Board of Trade and Lloyd's Registry, which have been most valuable, but the great advance in the superior quality of steel requires a corresponding severe and suitable test.

In 1881, when mild steel was coming into use for shafts, in order to compare its value with the usual and best wrought iron, I had test pieces cut out of iron and steel shafts, made to the same dimensions, and tested in the same manner. (No. 1, 2, 3, 4.) The dimensions were 1¼ in. square by 13 in. long, as per sketch, which shows the method in which the tests were applied.

No. 1, cut from a rolled bar of best Staffordshire iron, not machined, broke at one blow.

No. 2, cut from large chain iron, forged down to size and machined, broke at twenty blows.

No. 3, cut from a new best wrought iron crank-shaft forging, "machined only," broke at eleven blows.

No. 4, cut from a new best mild steel crank-shaft forging, and "machined only," stood *sixty blows* before breaking.

These simple tests showed the great superiority of mild forged steel above that of the best forged iron for the construction of shafts.

After an experience of steel shafts or sixteen years, I have neither flaws nor breakages to report, while gradually reducing the margin of safety of these steel shafts from 24 per cent. to 6 per cent.

In 1870, nine wrought iron shafts were renewed per annum. Now (1897), one wrought iron shaft was renewed per annum.

I give tables I. and II. with more particulars of these tests of wrought iron and steel. Table III. gives the gradual reduction of the factor of safety to present date.

I have some specimens here to show you, from which you will readily distinguish good and bad material, wrought iron and steel.

I conclude by stating that, amongst the many improvements in marine machinery made during the last sixty years, none has

added so much to the safety and efficiency of ocean-going steamers as the manufacture of mild forged steel made by the best English makers.

Mr. Milton said he would preface his remarks by saying he thought they were all very much indebted to Mr. Manuel, a very experienced engineer, for giving them the result of a lifetime of

TABLE I.

TESTS OF WROUGHT IRON USED FOR SHAFTS.

Tensile Tons.	Elongation in 5 in. per cent.	Bent.	Fractured. Blows.	Broke. Blows.	Fall of 10 cwts. In inches.	
			Ordinary shafts.	1881		
18	22	Good	9	11	12	C = Crank
		Best double	rolled scrap 4½	cwt. blooms. 1881		
18·6	24·3	Good	17	18	12	C = Crank
Best	iron, three good	qualities, rolled	into flat bars, and	cut into 4½ cwt.	blooms. 1881	
22	25	Good	21	32	12	C = Crank
			1896			
22·9	23	,,	12	14	12	T E □ = Thrust
21.9	25·7	,,	15	21	12	P = Propeller
22·3	26·7	,,	12	19	12	C = Crank
22·4	28·6	,,	22	30	12	P = Propeller
24	27·6	,,	20	28	12	piston rod, 10 in. dia. B □ sample

TABLE II.

TESTS OF STEEL.

Tensile Tons.	Elongation in 5 in. per cent.	Bend.	Fractured Blows.	Broke. Blows.	Fall of 10 cwts. In inches.	
24	—	Good	52	60	12	
27	25·9	,,	76	81	12	
A28	21	,,	26	32	12	F O = Crank
29·1	26·1	,,	67	80	12	C‡Crank
29·6	28·4	,,	71	78	12	
29·7	27·1	,,	70	86	12	D + Crank
*30·7	25 2	,,	75	89	12	A Crank
32	26	,,	70	89	12	
33·2	26	,,	74	84	12	

A Inferior steel condemned.
* After being nicked all round with a chisel, this piece (A) was broken under a heavy hand hammer and stood 22 blows.

TABLE III.

Year.	Percentage of Strength above Board of Trade Rules.	Tensile Tons.	Material.
1879	26	18	Wrought Iron
1881	24	24	Steel
1887	14	28	,,
1892	11	31	,,
1897	6	32	,,

Sir A. J. Durston, who opened the discussion, said that, according to Mr. Manuel the adoption of twin-screws did not lessen the danger of accidents, though they had been able, after the shaft of one engine had given way, to make their port with the other engine. He thought that was one of the main objects of having twin-screws, and that the twin-screw system justified its adoption from that point of view. Then Mr. Manuel had given an example of a hollow shaft having been eaten right away to the hollow part in the centre, and of course the shaft had given way. But they had had a large experience with hollow shafts in the Navy, and so far they had been satisfactory, and there had been no accidents. More work could be put into the substance of a hollow shaft, if properly made, than into a solid one.

Mr. Macfarland (U.S. Navy) said that in their comparatively limited experience in America the hollow shafts had done very well indeed, and never given any trouble.

careful examination of all kinds of facts which had come under his notice in the way of shafts. The paper began with reasons why shafts broke—through bad treatment, and bad designs, and so on; but Mr. Manuel had not given them any advice as to how to get over those particular points. He (Mr. Milton) thought he might confine himself to a few remarks as to what Mr. Manuel had so graphically put before them as to some of the failures which happened in ships in general use. No rules, either Board of Trade rules, or the rules of "Lloyd's Register," would provide for shafts if they were allowed to get out of line or made hot in the bearings and then cold water put upon them, and so on. One way was to carefully examine the shaft frequently. He was sorry Mr. Manuel's paper had not given sufficient credit to improved method of manufacture of crank shafts. He told the meeting that during the last four years the failures of crank shafts were very much fewer than they used to be. That Mr. Manuel attributed to the triple-expansion engine. His (Mr. Milton's) experience was that a very great part of the improved lifetime of crank shafts was due to the fact that now, in 19 cases out of 20, we had built shafts, whereas in the old days they were ordinarily solid shafts. There was very much better material used now than then and the design was better. P. & O. Co.'s fleet had been remarkably free from accidents to screw shafts. The majority of accidents to screw shafts came to vessels known as "tramps"—ordinary merchant vessels. It was very difficult to put one's hand upon a point and say that was the reason why a particular shaft was broken; there were so many reasons, especially in screw shafts. One of the reasons mentioned by Mr. Manuel was that a homogeneous material was not obtained. It naturally followed that if the shaft was made out of some thousands of pieces—some of them very ductile and others wanting

in ductility—when the strain came on the shaft the stiff pieces took all of it and the ductile pieces shirked their work. If so the stiff pieces had to break if they could not stand the strain, and then the fracture commenced. Mr. Manuel had remarked on the shafts made of iron, and had told them the way in which they ought to be made; but many of the shafts were made from the piles of scraps. He did not agree with Mr. Manuel on one or two points, for instance, when he said that shafts were made of forged steel scraps, though stronger than iron as regards tensile strength, contained similar defects to that of iron added to inequality of material. In his opinion a forged steel scrap shaft was far more equal throughout in quality of material than was likely to be obtained in the case of an iron shaft. The scrap iron of commerce was not a uniform material. There were many qualities of iron besides those Mr. Manuel had mentioned, and there were greater differences in the quality of pieces of iron than would be found in the quality of scrap steel. The ordinary ship scrap steel was very nearly of uniform quality throughout. Mr. Manuel had said that shafts and piston rods made in this manner were found inferior to that made of good homogeneous steel forged from the ingot, but he must remember that ingot steel was 28, 30, and 32 tons steel, so that when one spoke of ingot steel he did not know what he would get. Mr. Manuel appeared to underrate the use of hard steel for shafts. He showed in some of his tests of steel he gradually progressed from a tensile strength of 24 tons to a tensile strength of 33 tons. He noticed a singular thing that 27-ton steel broke at 81 blows and 33-ton steel stood 84 blows, so that he (Mr. Milton) thought in those tests that hard steel showed an advantage over the ordinary mild steel of 24 tons. If he had the choice he would prefer mild steel of 30 tons as the maximum to anything above 33 tons. He had had some experience where harder steel had been used, where the test had shown fairly good ductility, but nothing like the endurance of good soft steel, and he thought it was generally agreed that one of the first firms who started making steel shafts in this country built up their reputation for the very superior quality of their shafts through using the very mildest steel they could obtain. There was one point in regard to hard steel as compared with iron. When the fracture commenced it appeared to spread more rapidly than in iron. It was evident to him that iron took longer to break up after it had once begun to crack. That brought him to the question of nickel steel. One of his colleagues some year or so ago tested some nickel steel as against some of the best ordinary Siemens steel made in the large forgings. He tested that in the way Mr. Manuel had tested them, the fatigue test, which he believed was the most admirable way of testing, and there was very little difference shown in the number of blows required to break nickel steel or to break mild steel or the hard steel. There was not much to choose between them from those, but when the test pieces were nickel there was a most wonderful difference in the behaviour. Speaking from memory, the hard steel of 36 tons broke with the first blow of half a metre; the softer steel stood two or three blows; but the nickel steel took 16 blows from the height of a metre and three or four more from a metre and a half before it broke. Comparatively early in its life it began to crack, but the fracture was a gradually extending one right through, whereas with the carbon steel, when it began it went through with a snap. Mr. Manuel had been good enough to give them a sketch of a screw shaft, showing some serious flaws in it. Unfortunately it was a common experience to find shafts which had been in use two or three or four years, and sometimes less, which showed some of the flaws shown in Mr. Manuel's figure. Mr. Manuel suggested that the way to get over that would be to make the liner continuous. He had been working on the subject himself, and had had a great many statistics of the life of shafts and so on, and he had not been able to put his finger on the spot which caused them to go. His opinion was that there were very many causes at work which produced those flaws. One of them was, undoubtedly, corrosion, which set up at the junction between the brass and the iron. But from the nature of the flaws he felt that what actually caused the separation of the molecules of the iron was the longitudinal stress; it was not a tortional stress. By far the greater part of the shaft failures was due, he thought, not to the manufacture of the shaft, nor to the size of the shaft, but to the use to which the shaft was put. Certain shafts running in certain trades were what engineers called very hard in their shafts, while shafts used in other trades lasted for many years. Mr. Manuel's shafts and very many other shafts were subjected to hard driving work, steady stress on the shaft, but they were all loaded down in ordinary general trade, and not exposed to the same conditions as the tramp steamers. Very many tramp steamers engaged in very heavy trades made voyages of hundreds of miles in ballast. They were very thankful that a gentleman like Mr. Manuel, of so many years' experience, should come forward and give them his experience, and it was very gratifying to anybody who went to sea in the P. & O. ships to find that their ships were so free from all kinds of defects.

Mr. Thornycroft said he would confine himself almost to one point. In the tramp steamers, where the propeller struck the water three or four blows per revolution, there was a sudden change in the resistance of the propeller, which, taken into consideration with the ratio of the moving parts of the engine, subjected the shaft to a bearing stress occurring a number of times depending on the number of waves, and that was the cause of the trouble, which was accentuated by any change of section in the shaft. Mr. Manuel had told them that the strain put on the shaft was mostly longitudinal; he considered the cracks indicated that. He was not himself very familiar with those cracks, but he would point out that when a strong envelope was put on the shaft, although the gun-metal could not be so stiff as the shaft, from the fact that the stress of an equal material tended to increase exactly with the radius, the stress coming on the gun-metal, due to the fact that it was shrunk on, made a want of continuity, due to its action with the shaft, and at that point where it finished there was much greater stress, and, therefore, the want of protection led to corrosion due to the change of the tortional stress. He thought the suggestion of making that longer and taking it off was an important one, which should have the greatest attention. He would further remark that with regard to shafts there was a cause of fracture which had not been sufficiently considered, that where there was oscillation coincident with the natural period of vibration, with that there was a stress which might increase very largely. In the shaft, either due to the propeller or the engines, at times there was always an oscillation in the turning movement which the shaft had to bear. The shaft then twisted immediately to a certain extent, and if it so happened, owing to the length or other dimensions of the shaft, that the period of oscillation of the shaft agreed with the cause of vibration, in that case the ordinary rules for calculating the strength of the shaft would not indicate with any accuracy the amount of force coming upon it. At present he had not been able to answer that question, but he thought it was one that would repay investigation.

Mr. Alfred Holt thought the real cause of shafts breaking was because of the strain put upon them from the propellers. They had been in the habit of calculating their shafts in terms of their engines, when they should calculate them in a certain measure in terms of their propellers. The solution he had come to of the question was to have the propellers as small as possible consistent with the circumstances. Everybody present knew the immense variety there was in good shipbuilders' practice as to diameter of propellers. He had known vessels of equal size and H.P., with 4 ft. difference in the diameter of the propellers. It was quite clear that one with a larger diameter of propeller must import a tortional strain upon the shaft very much greater than the surface of the smaller propeller. There were instances of 17-ft. propellers breaking about 8 ft. off, and going along perhaps better.

Mr. Seaton said he was very much struck with a remark made by Mr. Macfarland on the previous day, that, instead of seeking out mysterious causes for things, it would be better to look for them under our noses. He thought that was perfectly true about shafts. In his opinion there was no mystery about the thing, but the fractures were due to perfectly obvious causes. The question of broken shafts had occupied his attention many years ago, when the Board of Trade first formulated their rules. Many present would remember that there was a particular ship which had a very much larger shaft in proportion to her power than any other ship. That ship broke her crank-shaft quicker than any other ship; they lasted scarcely six months. He thought the reason why they had better results from steel shafts was not so much due to the fact that it was steel as to the fact that much greater attention was paid to the designing of the main framework of the engines.

Mr. Mudd said that 90 per cent. of the accidents to shafting occurred to tail shafts. His name for some four years had been connected with an attempt to get over the mortality which had taken place in tail shafts by preventing the corrosive action. It

was a fact that an indiarubber covering to the tail-shaft of one-eighth of an inch in thickness preserved the shaft, and after four years of the use of that indiarubber coating he had seen many shafts examined, and the skin of the shaft found to be as perfect as when it left the shop. It seemed to him the thing was to get rid of the galvanic action, the initial action which ultimately destroyed the shaft.

REPLY.

MR. MANUEL.

GENTLEMEN,—I am warned by Sir Nathaniel Barnaby that, owing to the full discussion on this paper, my time to reply is now limited; therefore my reply will be brief, and by your leave I will endeavour to group those gentlemen of similar opinions together on certain points, and take Messrs. Durston, Macfarland, and Mr. Seaton, who are in favour of *hollow shafts*.

In Fig. 3 there is shown a solid and a hollow shaft of wrought iron, with the usual corrosion and water-action flaws at the termination of the liner, extending from the circumference inwards. The remaining part of the shaft was uninjured, and of good material.

It did not break at sea, but, the flaw being discovered in dry dock, the shaft was taken out and the spare shaft fitted. I had it broken, on the vessel's return, at the maker's works, to see the depth of the flaw, where it took two blows of a steam hammer to break it. What I contend is, had this shaft been a hollow shaft, it would have given way at sea, and the steamer would have failed to reach port.

My experience is that the metal adjacent to the centre does strengthen it when made of good material, and, as the flaws are generally in the modern-made shafts close to the circumference, or outside, many shafts would never have brought the vessels into port had they been hollow. I refer to the Mercantile Marine, where the engines are driven up to their full power continuously from year's end to year's end.

I am pleased to hear Mr. Macfarland, of the U.S. Navy, speak on this paper of his experience of hollow shafts, although I may say that the shafts in the naval services generally only running a short time yearly, are not subject to such heavy and continuous driving as in the vessels of the Mercantile Marine.

The fact remains that few hollow shafts have been adopted in the Mercantile Marine, and that for the reasons stated I am not in favour of hollow shafts.

I agree with Mr. Seaton's remarks that all mystery should be kept apart from the cause of breakages of shafts, and that the fractures and breakages are due to perfectly obvious causes, also that greater care should be paid to the designing of the main frames and bearings of the engines, but disagree in the use of cast steel unforged for shafts; in my experience screw shafts do not run well on cast iron or white metal. This has been all tried, but I find nothing better than lignum-vitæ wood, with the grain on end, and these ran for seven years and longer, though exposed to all kinds of service.

Mr. Milton mentioned that, while giving some of the causes that led to the breakage of shafts, I had not given any advice as to their prevention. As I have given the cause, he (Mr. Milton) would not have far to seek for the remedy. Take, for instance, the bearings getting hot and shafts destroyed owing to insufficient bearing surface. The remedy is very simple—increase the bearing surface until the shafts will not squeeze out the oil, but run on it, and so on; also use the best material for the construction of shafts, &c., &c.

The difficulty is to get makers to make alterations. The same with regard to the use of best material where the question of cost comes in, and so the shafts go on breaking.

I quite agree with Mr. Milton that the later method of building up shafts is an improvement when carefully done, though in many cases they have also given way from the above-mentioned causes, also cranks got loose from bad fitting and material.

I note Mr. Milton's remarks on the use of scrap steel forgings made out of ships' plates, and his preference for scrap steel over wrought iron, but I have no hesitation in confirming what I have already stated regarding its unsuitableness for shafts, owing to the presence of laminations, which develop into flaws; also hard and soft parts, which spoil the bearings—the same in piston rods—and have discontinued its use.

Mr. Milton refers to the difficulty in welding up so many and various small pieces, the creation of hard and soft parts, the soft parts wearing or wasting, and the hard parts projecting the same when used for piston rods, as in many cases they failed.

Mr. Milton points out that in the sketch (Fig. 9) of a screw shaft, where there are four flaws next the gun-metal lines, and that it is very seldom this occurs. I would explain that the four flaws were not in one shaft, but show the position generally of these flaws next the propeller, for sometimes there is one outside and one or two inside the stern tube, and the position may vary inside or outside, according to the circumstances that create them.

I have always found that where the end of the gun-metal lines are cut square down to the shaft, the grooving of the shaft increases more rapidly, and is caused by the cutting action of the sea water under pressure when directed to one point, added to corrosion due to the action of the different metals—brass or steel or iron. When the ends of the liners are reduced slightly and rounded over, this grooving is not so great. These screw shafts are drawn in and examined every four years, and when properly dried and painted there is very little corrosion after the first four years. A shaft will last under these circumstances for 17 years.

Mr. Milton mentioned that the accidents to shafts were peculiar to vessels termed tramps, or ordinary merchant vessels. This should not be, and I think he forgets that the P. & O. Co. have had constructed and acquired veritable tramp steamers, built to tramp specifications, and classed at Lloyd's during the last 10 years in order to retain their cargo trade and compete with the outside tramp steamers, some carrying a few, others no passengers, and with nothing but iron decks. The speed of the mail ships, being gradually increased, left little space for cargo; and still I have not found the breakage of shafts he predicts. Only one instance I met with, and that was one of the malleable iron cranks getting loose, through bad fitting. The company have about 20 cargo vessels, and they have to run part of their voyages with water ballast only.

Mr. Holt.—I agree with Mr. Holt that keeping the diameter of the propeller to the smallest practical diameter for efficient propulsion lessens the risk of damage to screw shafts, more particularly in vessels running under water ballast, and that designers should aim at this, also design the propeller in accordance with the strength index of the shaft.

Mr. Thornycroft.—I agree with Mr. Thornycroft in regard to the effects of vibration, particularly in twin-screw steamers.

Mr. Mudd.—I agree with Mr. Mudd that most of the breakages of screw shafts are caused by the grooving of the shafts near the ends of the liner caused by the action of the sea water on the bare shaft, accelerated by the action of the sea water on the different metals, such as gun-metal, iron, or steel, when the shaft becomes rapidly weakened, and eventually breaks. Where the shaft is protected there are few breakages.

I do not think there are many breakages due to longitudinal strains, unless the after-bearings are allowed to wear down excessively, such as has been noticed in twin-screw vessels, and when the shaft's bearings wear down one to three inches, causing the shafts to flop about in the bearings. The shaft would then begin to show flaws, such as shown in Fig. 6, and eventually give way; but so long as the bearings are of ample length, shaft in line, and well supported, few shafts break from long-sustained strain.

I should have wished to reply to some of the speakers more fully, but, being advised that the time is short for the other papers, I have now only to thank you for the patient manner you have listened to this paper, and the different speakers for their able discussion.

IMPROVED OIL CANS.

MESSRS. JOSEPH KAYE & SONS, LIMITED, of 93, High Holborn, London, W.C., and Patent Lock Works, Hunslet, Leeds, are putting on the market two oil cans of novel and improved designs. There is usually a certain amount of risk in oiling machinery in motion, and locomotives, traction engines, marine engines, motor cars, etc., especially when a lamp has to be held in one hand and the oil can in the other. The patent interchangeable lamp and oil can is intended to minimise, if not altogether

remove, this risk. Fig. 1 represents the combined lamp and oil can ready for use in its double capacity. When it is thus employed, the person using it has the advantage of having one hand at liberty, but as it may not always be required in this double capacity, it is so constructed that the lamp can be easily detached from the can, and the latter employed in ordinary

Fig. 1.

work. Fig. 3 shows the lamp detached, and the other illustration (Fig. 2) shows the can alone ready for use. When the two are required the can is simply placed in the lamp, to which it is latched automatically. The invention is remarkable for its simplicity, and this interchangeable lamp and can will, no doubt,

Fig. 2.

be found very serviceable for the purposes for which it is intended.

Fig. 4 represents another of this firm's useful patents. This is a seamless oil can with a concealed valve. It has a brass spring bottom, and has a valve in the spout. When the bottom is pressed by the thumb the valve is opened, and thus the oil is

Fig

allowed to run from the spout; when the thumb is removed, the valve closes, and the flow of oil is cut off, but the spout is left full, ready again

Fig. 4.

for immediate use. Another feature is that the spiral spring of the valve preserves the flexibility of the brass bottom, so that pressure never fails to free the oil. The can is also fitted with a filter, so that the spout cannot be choked up.

THE PEERLESS METAL.

WE are not yet at the end of the various alloys that our metallurgists are constantly discovering and introducing with special adaptability to various purposes.

Amongst this crowd of competitors for public favour the Peerless Metal, introduced by the Peerless Metal Co., Limited, of 38, Parliament Street, Westminster, seems likely to take a high place.

We have a sample before us and can thus practically verify that it is a white metal closely resembling old silver in colour, that it takes a beautiful face and polish, and as we are assured that it is of uniform quality throughout it will evidently wear indefinitely, and with the same colour and polish, thus entirely displacing, for merit and durability, any silver-plated goods.

It is claimed for it, that it will not oxydise nor tarnish under exposure to atmospheric influences, nor is it even affected by salt water. This is most unusual, as it is well known that the great drawback to aluminium plates hitherto has been the readiness with which it has been attacked by sea water. In fact the surface is so brilliant and takes so fine a polish that we see a user testifies that his lamp reflectors made of this metal never require silver plating. He states that all other white metals to his knowledge must be plated.

There are obviously a great number of trades in which such a metal will prove invaluable, but in the special trades in which we are interested this metal may be used with great advantage in cabin and saloon fittings, in lubricating cups and tubes for marine engines. The Earls Shipbuilding Co., Limited, of Hull, have thoroughly tested the metal, and their general manager and director, Mr. A. E. Seaton, seems from his statements to be thoroughly satisfied with it.

Apart from and in addition to its merits as a decorative metal, it has such good qualities in tenacity, elasticity, and resistance to crushing—as certified by elaborate tests by David Kirkaldy & Son, that the metal quite takes a prominent place in its qualifications for structural strength and ease of working, either in plates, rods, or wires.

It would appear to be a metal, if not too expensive in bulk, for the blades of propellers, in which corrosion is so frequent a cause of trouble. We would be interested to know how far parasites would adhere to its polished surface in long voyages. Should it prove that they cannot retain their hold upon it, it would appear to be the metal of the future for this purpose. It is worth testing also in place of the usual aluminium alloy for light torpedo-boat plating, owing to its non-corrosibility in sea water.

In drawn wire its ultimate tensile strength is as much as from 50,000 to 87,000 lbs. per square inch. As a casting too its ratio of the limit of elasticity to ultimate breaking strain is very high, amounting to 62 per cent., and its ultimate breaking stress is about 40,000 lbs. per square inch as an average.

This metal appears to us to have an important future before it in the Mercantile Marine and the Navy, and we shall be glad to hear more of it as tests under different conditions and applications proceed.

THE BOON METALLIC PACKING.

PACKING, though but a small adjunct to a marine engine, is a most potent factor in the comfort or otherwise of an engine-room. The constant attention sometimes required by the ordinary hemp packing to maintain it in good steam-tight condition is well-known to any who have had charge of marine engines, and we know of nothing more unsightly and more derogatory to a well-kept engine-room than leaky stuffing-boxes.

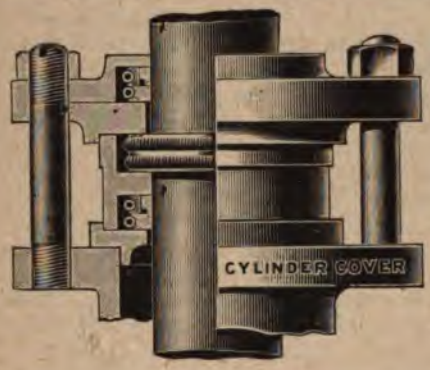
Messrs. J. Boon & Co., of Cromford Court, Manchester, are introducing rapidly a new form of metallic packing, which we illustrate herewith, and which is guaranteed by the makers to be always tight without attention so long as the rods are fairly true and not badly scored, or fluted.

It is claimed also that this packing is practically

frictionless, thereby saving a considerable amount of power wasted in the old style of fibrous packing.

It will be seen by our illustration that the whole gland and packing is self-contained, and is adapted to the usual studs of an ordinary stuffing-box; therefore, no alteration of the old engine stuffing-boxes is required for the adaption of this packing.

The packing and gland consists of an outer case or gland, built up in sections, having three separate compartments, in which are held the metallic rings.



These rings, of which there are two in each compartment, are each divided into three segments, and held at an equal pressure to the rod by means of a composite metal spiral spring band. This spring is of metal not affected by heat and non-corrosible. Ample space is allowed in each compartment to allow the rings to move freely with any oscillation that may be caused by the rod not being in line with the cylinder.

It is guaranteed by the makers that this packing will cause no injury to the rod and is perfectly steam tight, however high the steam pressure.

KINCAID & CROCKATT'S PATENT GREASE SEPARATOR, FILTER AND FEED HEATER.

THE risk of overheating and collapse of furnaces caused by the introduction of oil or grease into boilers, especially those worked at the high pressures now in common use, as well as the pitting action set up on plates and tubes, has made the filtering of the feed water a necessary function in all well-equipped boilers. The economy of fuel and prevention of leakage by the introduction of hot feed water has led to the general adoption of feed heaters. It is also now generally recognised that the air pumped into the boilers along with the feed is a fruitful source of corrosion, and the extraction of such air has been found to be of great advantage.

It is with these facts in view that Messrs. Kincaid & Crockatt have designed a grease separator and also a filter and feed heater, which they have combined to produce the desired result.

In Fig. 1 we illustrate this combination in section, rom which the working of the apparatus is clearly seen.

The exhaust pipe is provided with spiral plates cast integral therewith, which cause, by the centrifugal force set up, the oil, grease or dirt carried by the steam to be thrown against the sides of the pipe into the annular collector at the lower part. From this they are drained into the filter which retains all extraneous matter, allowing any condensed steam to pass to the bottom of the condenser in a pure state. Its action is quite automatic, and the filter will run for weeks without being opened, as the filtering area is very large, and the amount of condensed steam passing through it is small. The slight difference in pressure between the exhaust pipe and condenser, added to the fall, is quite sufficient to keep up a constant suction through the filter.

The filter is fitted with a cage of wire netting in the form of a cheese cover, over which a woollen hood is drawn, the bottom edges being folded over the lower

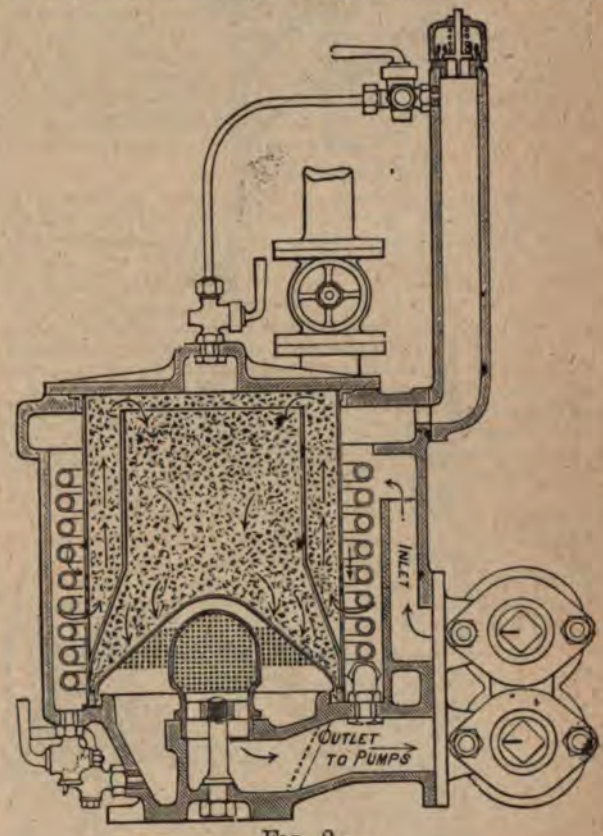


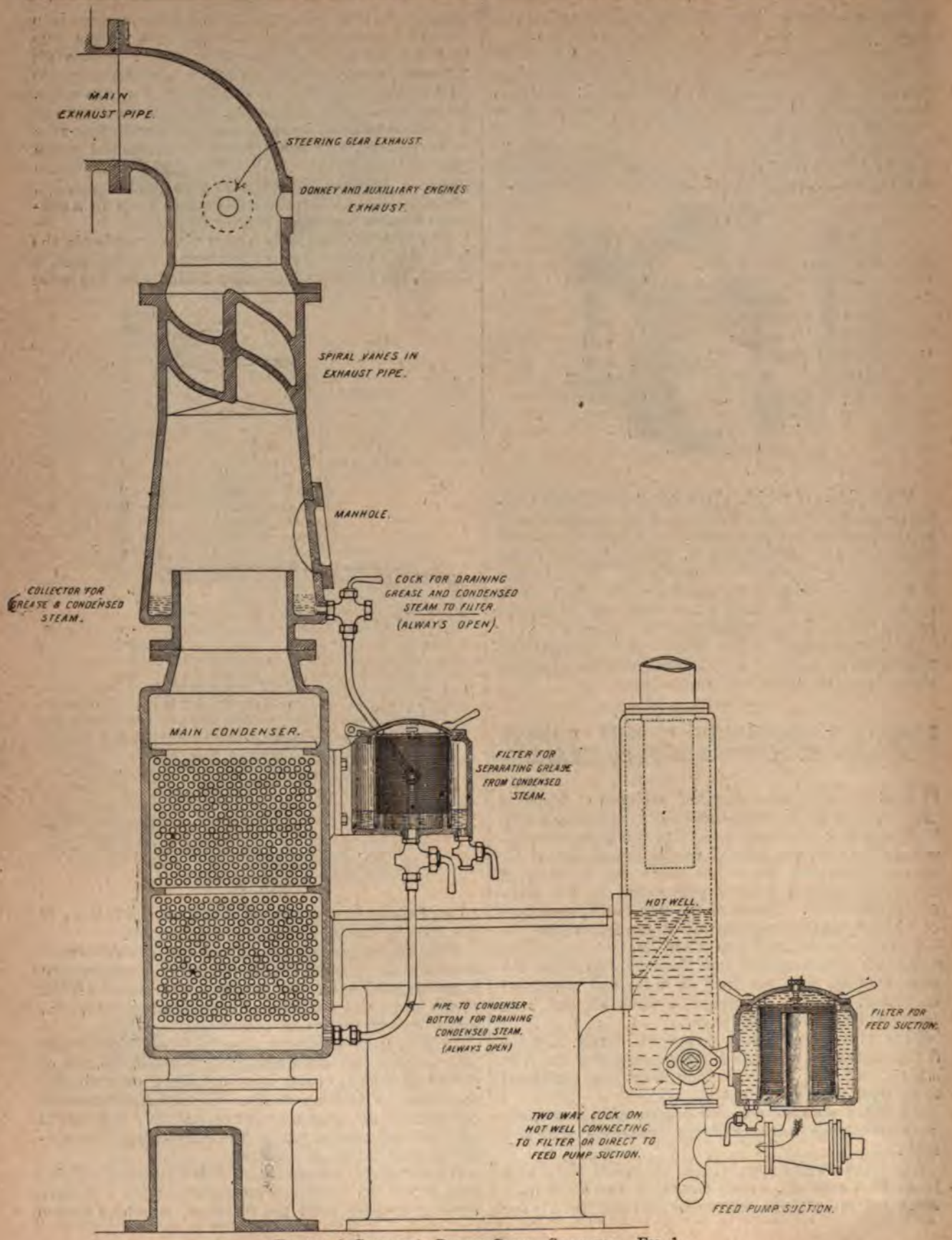
FIG. 2.

edge of the cage and pressed down on the bottom of the filter by the lid so forming a tight joint.

The water, grease, etc., enter the annular space outside this cage, and the filtered water passes through it to the condenser. An auxiliary filter may be fitted to the feed pump suction to intercept any grease, etc., introduced by pumps or otherwise.

In Fig. 2 we illustrate a special form of feed-water filter which has been designed to avoid the use of cloths or hoods, cocoa fibre cylinders or such like materials as filtering media. The constant renewal or cleaning of these constitutes, not only a source of trouble and annoyance to the engineers, but a continual expense to the owners.

The filtering medium used in this filter costs nothing and is always available, consisting simply of broken clinker or slag from the furnaces, which is passed


MAIN EXHAUST PIPE.
STEERING GEAR EXHAUST.
DONKEY AND AUXILLIARY ENGINES EXHAUST.
SPIRAL VANES IN EXHAUST PIPE.
MANHOLE.
COLLECTOR FOR GREASE & CONDENSED STEAM.
COCK FOR DRAINING GREASE AND CONDENSED STEAM TO FILTER (ALWAYS OPEN).
MAIN CONDENSER.
FILTER FOR SEPARATING GREASE FROM CONDENSED STEAM.
HOT WELL.
PIPE TO CONDENSER BOTTOM FOR DRAINING CONDENSED STEAM. (ALWAYS OPEN)
FILTER FOR FEED SUCTION.
TWO WAY COCK ON HOT WELL CONNECTING TO FILTER OR DIRECT TO FEED PUMP SUCTION.
FEED PUMP SUCTION.

KINCAID & CROCKATT'S PATENT GREASE SEPARATOR. FIG. 1.

over a sieve and well washed to free it from grit and dust. After use it is emptied on the stokehold floor, and a fresh quantity put into the filter case.

This case is made of light galvanized steel, and being simply held in position by the outer lid of filter can be removed and replaced in a few minutes.

Provision is made for separating and carrying off to the condenser any free air that may be brought into the filter along with the water. This separation is much more complete when the water is heated before entering the filter case.

The lower portion of the outer part of the case is perforated for admission of the water, the perforations being about three times the area of the feed pipe; the water entering these rises through the broken clinker to the top of the filter, passes over the inner cylinder and down through the central mass, escaping through the perforated bottom of the case. The water having thus to pass through a depth of 16 in. to 20 in. of filtering material is very effectively cleaned. The outlet to the feed pumps is protected by a brass rose having small perforations, so that nothing may possibly pass into the pumps that might injure the valves. Any grit not properly removed from the clinker falls into the settling chamber formed by the annular space around the brass outlet casing.

The feed heater consists of a series of pipes in the outer casing, of horse-shoe form, expanded into a steam-tight chamber bolted to the side of the filter, supplied with steam from the evaporator or other convenient source.

This chamber is divided, the steam passing from one side to the other through the pipes, and thence the condensed steam is drained into the suction of the feed pump.

We understand that the grease separator has been in use for three years in the s.s. *Baron Huntley*, of Glasgow, 800 I.H.P., trading to Spain, and has given great satisfaction. As an example of the necessity for a filter, we may mention that one engineer who has been using the clinker filter, found that although using no cylinder oil regularly except for swabbing rods, that the clinkers were saturated with grease in one week, and required changing.

The sole makers of these devices are John G. Kincaid & Co., of Clyde Foundry, Greenock.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Late Mr. Lever.

ON the 4th of August there died at Fulham a man, who, in his time, exercised a great deal of influence on the shipping world, and who, 40 years ago, was considered one of the apostles of steam navigation. Yet the death of Mr. John Orrell Lever passed almost unnoticed, and the brief paragraphs that were given him were written in virtue of the fact that he was "some time Member of Parliament for Galway." That he was member for Galway is true enough, and with Galway will his name ever be associated. But it is not because of his Parliamentary representation of the borough. It is in virtue of what the writers had forgotten, namely, his unfortunate attempt to make Galway a terminal port of a great transatlantic mail line. He obtained a liberal subsidy from Government. He had the resources of Ireland, such as they were, at his back. He could claim the shortest sea passage to the New World without fear of contradiction, and yet the Galway Mail Company was one of the greatest failures that has ever befallen modern enterprise. A reminder of this ill-starred experiment may not be thrown away upon those extraordinary individuals who think that they will be able to make Milford Haven and the Ayrshire Loch into rivals to Liverpool, Plymouth, and Southampton. Galway shows conclusively enough that trade in shipping matters, at least, follows its own channels, and cannot be diverted to convenient junctions. Railway men may create a Crewe, a Swindon, or a Normanton, and may make huge populations collect where the land has been nothing but a prairie, but shipping men cannot make ports where stands a fishing village, or where a few coasters only call. It is true, of course, that there were misfortunes connected with the Galway venture beside the primary mistake in the choice of the terminal port. It was unfortunate that the vessels built for the work should have been structurally too weak for the Atlantic trade, and would therefore have failed independent of the merits or demerits of the port from which she had started. But other new lines have lost ships. We have even known lines, which have lived and prospered, spend large sums of money on strengthening their new craft. These things are mere incidents, unpleasant, no doubt, tending to postpone the dividends of shareholders, but not fatal to concerns which have in themselves the makings of success. Those the Galway scheme had not, and so the remains of the Galway fleet went to Southampton docks, and Mr. Orrell Lever and his friends sustained very serious pecuniary losses.

Messrs. Kellock

Have sold the wreck of the *Angloman* by auction for the sum of £115, it having been found that though she held together in a way creditable enough to her builders and the material of which she was made. Shipbuilders and ship-raisers did not tumble over one another in their desire to tender for her on the basis of a live value. The price she realized shews that the chief salvage has already been made, and that, though she holds well together, the experts in these matters feel well assured that there is no chance of getting her off and making her ever walk the waters again.

The same firm have effected a sale of the old Cunarder *Kedar*. I was wrong in stating, some little time ago, that she had been taken over in part payment for one of the new boats. She goes to Italy, and the brokers who effected the sale may be congratulated on obtaining a price of 30s. a ton for a steamer of her age. She was built in 1860.

By the way, the third of the new Mediterranean Cunarders is now in the water, and I hear that the first of them, which has just come back from her maiden trip, has done very well in spite of the croaking of those who seem to think that a reputation for neatness and wisdom can be attained by finding fault with everything that the premier Atlantic company puts its hand to.

A Big Salvage Award.

Though American law is based upon the English, the methods of the American Courts are by no means as expeditious as those of this (so-called) effete old country. The American liner *S. Paul* went ashore at Sandy Hook—as my readers have probably forgotten—in January, 1896. It is since the last issue of the MARINE ENGINEER that the salvage award in this matter has been made public. No less than thirty-two thousand pounds sterling was awarded to the fortunate companies who appeared as claimants. This is a very large sum, at least, in our notions. True, the vessel had a very valuable cargo and much specie. But the precious metal was taken away to New York by Lloyd's agents ere ever the wreckers appeared on the scene, and, when allowance is made for the award in respect of the cargo, a sum of no less than £26,000 was given in respect of the vessel herself. It is interesting to see that, for the purposes of this salvage action, the vessel was valued at over half-a-million sterling. European-built ships in the Atlantic trade would not find themselves assessed on so high a valuation. Take for example the recent case of the *Spree*, a vessel which, of course, neither in size or in power is equal to the *S. Paul*, but which, nevertheless, till the big boats get to work, is the commodore ship of one of the biggest lines in the world. She was only valued—ship, cargo, freight and all—at £85,000 when she made her recent appearance in the Admiralty Court in London. She is a steamer of 7,000 tons and seven years old, against the 11,500 tons of the two-year-old *S. Paul*. Shipbuilding in America is undoubtedl much more expensive than it is in Germany.

Brindisi

appears to be waking up under the competition of Marseilles and the fear that it may become a mere mail port for the P. & O.

Company. It is about, according to the Roman papers, to build a new quay adjoining the railway station and to roof in the approach thereto, so that train-to-boat facilities may be afforded here as elsewhere. This is, of course, all very well, and it will, no doubt, be a great convenience to those who run through with the mails and use the port when the new P. & O. contract with the British Post Office comes into use. But it must be remembered that when the new *Osiris* and *Isis* get to work the traveller will have a chance of embarking at Marseilles by all outward P. & O. mail boats, and he is very much more likely to do so, and get direct to what will be his home for some little time than go *via* Brindisi to save a few hours more and have an extra change at an Egyptian port. There will, of course, always be travellers to whom an extra hour in the City will be worth any amount of money and of discomfort, but that class is small, and a large part of those who are in a hurry will be quite content with what Marseilles can afford them, viz., a moderate saving of time at a moderate cost, and an escape from the possible inconveniences of the Bay of Biscay.

The Mersey Dock and Harbour Board

has published its annual report. It is satisfactory to read that the shallowest line of soundings on the Bar now shows a minimum depth of 23 ft. at low water spring tides. There is another complete line which gives a further depth of 2 ft., so that the hindrance has practically been removed, though, of course, operations are still in progress. The new jetty at the north end of the landing stage is now completely finished, and attention is being paid to the removal of the Pluckington Bank as well as of the Bar. The Board has now a very large and complete fleet of dredgers.

A Board of Trade Inquiry

into the circumstances attending the wreck of the P. & O. steamer *Aden* has been held at Westminster. Very little fresh detail transpired. It appeared that the main bunkers of the *Aden* held about 15 days' supply, and that, when the vessel left the East, the reserve bunker was filled with cargo, as, of course, the voyage she was upon never involved a run between ports which was likely to trench largely upon her main supply. But the vessel was to call at Havre, and when Colombo was reached it was found that the French authorities were treating Aden as an infected port. For the convenience of all on board, therefore, it was determined that the vessel should not call at Aden but proceed direct to Suez. In view of the weather likely to be encountered it was deemed advisable to put a little extra coal on deck. So two and a-half to three days' supply extra was shipped in view of contingencies. Before the vessel approached the island of Socotra there was room in the bunkers for this coal and it was taken below. A good deal of fuss seems to have been made because the vessel had a few tons of coal on deck, but when the matter is examined it is a very trifling affair, especially when we remember that her total displacement was about 8,000 tons. Then it appears that, whilst the coal was being shifted, the vessel was, for a time, put off her course for the purpose of easing the operation. The Court of Inquiry is unable to arrive at any opinion as to whether this deviation had any effect in putting the vessel off her general course when she resumed her voyage towards the mouth of the Red Sea. It would appear, however, that the manœuvre was a very simple one, and that it should have been easy for the navigating officers to do it without danger. But this we shall never know, for, of course, there was no detailed evidence on the point. Another point raised in the discussion in regard to the loss of the ship had to do with the employment of Lascars. But it could not be said that the composition of the crew had anything to do with the stranding, or with the subsequent loss of life. And certainly after the wreck the Lascars behaved with exemplary patience and pluck. In the result the Court came to the conclusion that, subject to the possible effect of the deviation already mentioned, it could only suggest as a possible explanation of the stranding that the captain had allowed for a strong current, which usually prevails in the vicinity of Socotra, but that, in fact, its strength was at this time largely neutralised by the effect of the monsoon.

The Court added a very proper note of appreciation for the behaviour of all the crew, white and coloured, officers and men. It is gratifying to see that the two engineers, who were the only two certificated officers left, did so much for the comfort and safety of the passengers when the command of the little party devolved upon them. The question of the erection of a lighthouse upon the eastern extremity of the island, though mentioned, did not come within the scope of the inquiry. But it has since then had the attention of the Board of Trade, and an informal conference in regard to the matter has been held at Whitehall. It was attended by, amongst others, representatives of the leading British steamship lines trading in those seas, and it was said that the general trend of opinion was in favour of the placing of a light on the island. It is believed, however, that nothing can be done without Parliamentary sanction, and, as Parliament is up, that means that no practical step can be taken for at least another year. It is remarkable in this connection to remember the story told at the time the news of the *Aden* disaster came to hand, of the Orient Line skipper, who, passing Socotra, and, commenting on its dangerous position and the absence of a light there, said it would never be lighted until a P. & O. steamer was lost there. He rightly appreciated the magic which seems to attach to the name of the great Eastern company, a magic which seems due, not to its size or to its present mode of operation, but simply to its traditions and to the popular remembrance that at one time it was the only link with India.

A New Steamer.

Speaking of the Orient Company reminds me that Fairfield has an order for an improved *Ophir*. She will be a vessel which, though not equal in size to the four big North-German Lloyd steamers, will be no unworthy antagonist to them, especially as she will have a greater speed than they have as yet displayed

On the Atlantic,

where their passages during the present summer have been from nine to ten days between Southampton and New York. There have been complaints of poor traffics amongst the mail service steamers this year. But it is said that the cheaper and slower lines, such as the Altantic Transport Company and this subsidiary summer service of the North German-Lloyd Company (maintained by the vessels which in winter go on the Australian station) have done well.

The Hamburg-American Line

has sent me a very pretty little booklet which they have published as a memento of their jubilee. It contains a history of the development of the undertaking. This I need not refer to again, as I have already remarked on its humble beginnings and present magnitude. We are, however, here furnished with excellent illustrations of the vessels which, at various stages of its history, were provided for the maintenance of its services, and these pictures include vessels of both early and modern date, as well as views of their depôt at Hoboken, New Jersey.

The Shipmasters' Society of London

gave, at the beginning of August, an interesting little exhibition at the Fishmongers' Hall, London Bridge. They showed a number of pictures of vessels of various kinds, and a good deal of modern scientific apparatus, including specimens of Lord Kelvin's most useful aids to navigation. But the most interesting part of the exhibition was certainly the ancient appliances which were shown. These included Captain Cook's sextant and the charts he used on his memorable voyages. Of course, we all know that in the last century the French were vastly our superiors in the sciences, even as far as shipping was concerned. Their ships were far better designed than those built in English yards. Yet it seemed a little strange to find that the great circumnavigator used French charts. The exhibition was opened to the public, though it does not seem to have been advertised much, and few people knew of it. It would certainly have been interesting to engineers as well as to those connected with the other branch. Engineers, however, would have to content themselves with drawings and models if they desired to give a show of what they are concerned with, for actual machinery and boilers would take up more space than the appliances which are in use on deck and on the bridge.

The subsidised Merchant Cruisers.

A certain member of Parliament who has had considerable experience in the Navy, and who writes a great deal on Naval matters in the daily press, made a sad bungle in the House of Commons by his attack on the mail steamers on the Admiralty list for use in the time of war. He attacked the continuance of their subsidy on the ground that they had inferior coal capacity. A more absurd contention never was put forward even by a member of Parliament. The naval vessel is singularly deficient

in coal supply. Foreign vessels content themselves with two or three days' full speed consumption. So did we till we found out the error of our ways a few days ago. Our more recent ships are better off. But it must be remembered that "the radius of action" given as that of our warships in official and semi-official documents means their power to traverse the distance named at their absolutely most economical speed. One cannot even be sure that it allows for the demands of the auxiliary machinery which now uses so much steam. Moreover to get the full radius named a certain, and not unimportant extra bunker amount must be carried. This will, at sailing, put the ship's draught at something very considerably below her designed load line. But with the merchant steamer things are quite otherwise.

She is accustomed to make 3,000-mile bursts at full speed, and, of course, must be designed to carry enough coal for that, and for contingencies as well. And she travels for profit, which the warship does not. She must therefore in time of peace carry cargo. When she is employed in Government service the conditions are changed and her cargo space can be used to help out her bunkers. Mr. Ismay, to whom we are really indebted for the armed cruiser idea, took the trouble to answer the attack by a letter to the *Times*. He told the public that the *Teutonic* and *Majestic* could steam to India round the Cape without coaling at full speed. (Could any naval ship dream of such an exploit?) The new *Oceanic* will do even more than this. But Mr. Ismay had said enough. He did not say, as he might have done, that a White Star passenger boat, the *Doric*, holds the world's long distance steaming record. It is a record hard to beat, for there seems little chance of anyone starting on a longer voyage than she did, when she went out to San Francisco round the Horn, and did the whole run from England without a stop. I venture to say that no naval man, unless he be an engineer, will credit the assertion. But the fact remains. The value of the *Teutonic*, and of the *Campania*, and of the Empress boats, all with their protected machinery and steering gear, and with their twin-screws and great capacity will be untold if we should find ourselves involved in war at any time. The pity of it is that we have not any others. P. & O., for example, might make their vessels equally serviceable if they would only go in for the trifling extra first expense of duplication in the main machinery of their larger boats.

Electric Lighting

has been engaging the attention of the Board of Trade officials. It is probable that the events connected with the loss of the *Aden* had something to do with the official notice which the Department has sent round amongst it surveyors. It was given in evidence that on board that ill-fated vessel the electric light went out some ten minutes after the ship struck, because the water got on to a friction wheel and so stopped its working. The Board of Trade therefore directs its surveyors to "strongly recommend that the position of the source of the light be at such a height in the vessel as to prevent as far as possible the contingency of the light being extinguished."

This love of placing the dynamos on the lower platform of the engine-room has always struck me as an extraordinary one. It is said, of course, that the position places them where they are most easily kept under the eye of the engineer on the starting platform. But they are not only when placed there in risk from the entrance of water in case of stranding or of collision, but they are also in a good position to get any dust and dirt that may be blown out of the neighbouring boiler-rooms. Besides, it does not always follow that what a man has directly under his eye, especially when he has other things to attend to, gets as much attention as that which is a trifling distance off, and to which he makes it his duty to go at stated and regular intervals.

The New York Mediterranean Trade

seems to promise well in the near future. The Anchor Line was the first of the Northern European Lines to discover its capabilities, but they did little except emigrant work. Then the North-German Lloyd people put on their older express steamers and made a cabin traffic.

The Hamburg-American Line watched the experiment, and found it better for their steamers to run to the Mediterranean in the winter months with tourists for the Levant, than to continue in the Hamburg and Southampton Line. Even the Compagnie Generale Transatlantique found encouragement to send *La Touraine* in the same direction. Competition waxed keen and a pool was established. Now the happy party is threatened by the advent of the Prince Line, which is about to put on some of its best vessels and to charge lower rates than the pool permits. That the trade is considered valuable may be gathered from the fact that the North-German Lloyd Company announces that two of its later Express boats—the *Saale* and one of her sister ships—are to be put into their Mediterranean sailings this winter. The *Saale*, it may be remembered, has only recently had a very extensive overhaul, resulting in a considerable increase in her sea speed.

The New North-German Lloyd Express Steamers

are in a very forward state. The maiden sailing of the Vulcan-built Kaiser Wilhelm der Grosse is to be made on the 15th September. I shall hope in the next issue to be in a position to give a full account of her, as I hope to have an opportunity of seeing her during her brief stay at Southampton. The travelling public seems to be anxious enough to try her paces, for I hear that berths aboard her were unobtainable, in the saloon at least, some time ago. The sister ship from Schichau's yard will not be out this season, her first sailing being put down for a date in April, 1898. The running of these two vessels, both designed for the same service and for the same speed, yet so different in size and power, will be watched with great interest.

Meanwhile I hear that the company is contemplating a further move, which may have very startling results for some of the less progressive mail lines.

An Excellent Suggestion.

We cannot avoid accidents, however carefully we may guard against them. The wise man, therefore, is wont to look back into his experience, and see how, if misfortune is bound to recur, he can best minimise its ill results. I mentioned, in reference to the Aden Board of Trade inquiry, the fact that only engineer officers were left on board the wreck, and that one of these remained all the long and weary days of waiting for help with a dislocated shoulder. The surgeon had been lost in one of the boats, and no one amongst the passengers or crew had any surgical knowledge. It is obvious that the experience of this engineer, though it has been especially prominent, is by no means unusual at sea. One knows of many cases of accident on board, sailing vessels where horrible sufferings have been endured for long periods by unhappy men who have been without ordinary attention, and where the want of professional or skilled aid has left the unfortunate sufferer a mere wreck, even if it has not thrown away his life altogether. But it is not in sailing ships alone that the need for some skilled aid is found, for surgeons themselves are not free from the chances of humanity, and, as in this case, may die and leave their shipmates helpless. Attention has, therefore, been turned to the question of ambulance classes for seamen, so that where a surgeon is on the spot he may be able to have from the crew someone in whom he can place confidence to do the nursing under his direction; and in cases where there is no surgeon, that there may be someone on the ship who can be relied on to alleviate the sufferings of the injured man and effect simple operations, such as the reducing of a dislocated joint or the application of a tourniquet to a wounded limb.

Now attention is called to the fact that the Mission to Seamen has for some time been engaged in holding ambulance classes for seamen. The work it has done has already resulted in making not less than a thousand men in the Mercantile Marine efficient in the work of first aid, according to the standard of the St. John's Ambulance classes. Those who have undertaken the work of instruction are anxious to let the Mercantile Marine generally know of the educational facilities they offer in this regard. It may be well, took to mention that influential public bodies recognise the importance of the work that is being done, and are taking measures to encourage it. The Board of Trade will endorse on the certificate of any officer the fact that he has passed his ambulance class. The corporation of Trinity House, too, has now sixty-one of its employés qualified in ambulance work, and several of their lightships now have at least one of these men amongst the crew. Men who, like engineers, have a scientific training, as well as the handiness which is so general a characteristic of seafaring men, might well be inclined to take up this course if the fact of their ability to attend the classes were only notified to them.

The Atlantic Cunarders

have been doing very well lately. The big boats have crossed with remarkable regularity, if not with actually higher speed than in previous summers, but the old *Etruria*, on her 145th outward voyage, beat any previous performance either of her own or of any other single-screw ship. She ran out at a mean speed of 19·73 knots, doing 495 nautical miles in her best day's steaming, and effected the passage in 5 days 21 hours and 10 minutes. This is indeed an achievement for a vessel of over 12 years of age.

The Vicissitudes of the Old "Foudroyant"

have always been followed in this column, so I may be pardoned for another reference to them. The vessel had been restored as nearly as possible to the condition in which she was in her glorious youth by her owner, a person of means, who wished to make use of her as an educational factor for the purpose of extending an intelligent interest in naval affairs. She was accordingly sent round to various watering-places, and shown as a kind of Nelson Museum. A charge was certainly made for admission to her, but she was in no way made a raree show like too many unhappy old ships, and the charge made was not such as could to any material extent help to recoup the owner for the very large outlay he had made upon her. In the month of June the vessel, then in course of registration as a merchant ship, was lying off Blackpool, when a sudden and severe gale sprang up, and she went ashore on the sands. Of course the stout old ship got a severe hammering, and became sufficiently uncomfortable to make those on board anxious to go on shore. Next morning, to the horror of the owner, who looked upon her as a sacred relic, she was painted all over with an advertisement of a patent bolus. Hence an amusing action at Liverpool Assizes, and a substantial verdict against the enterprising medicine man. But the poor old vessel's ill-luck did not end here. Attempts were made to get her afloat again. At the end of July the Clyde Salvage Company were at work upon her, when another gale sprang up, and their steamer *Anna* was wrecked alongside. Then the *Aurora*, of Troon, a wooden sailer, was employed in the work, and she, in August, broke loose and became a total loss. Meanwhile the old ship still holds together, and it is still hoped that she may float again.

The Isle of Man Steam Packet Company

has so far had a record season to compensate it for its expenditure in buying off the opposition with which it was threatened. Its new steamer, the *Empress Queen*, built at Fairfield, seems to be giving satisfaction, and the arrangements for coping with the August Bank holiday were very complete. The commodore of the line, Captain McQueen, who was one of the best known amongst the coasting captains, has retired after a very brief command of the latest addition to the fleet. He had been 35 years in the company's service, and had of course seen great changes in the vessels of the line, and in the number of passengers carried. The steamers have quadrupled in gross tonnage during this period, whilst their speed has nearly doubled. Captain Hill, from the *Mona's Queen*, takes the senior position now.

Paddle Steamers.

There have been recently two or three prosecutions of captains of big pleasure steamers on the Thames for excessive speed. In the instances which have been brought to notice damage had been caused, and the captains have been fined. A well-known London wharf-owner has been writing to the Press in this connection. He complains that the damage done to barges by the wash of these vessels exceeds on the average a hundred pounds a month. He gives details of cases which have occurred under his notice in proof of his assertion, and asks the Thames Conservancy to prohibit the use of these fast paddlers above Tilbury. His contention is that the river above that place is quite unsuited for this kind of traffic, and he asserts that in the interest of the passengers themselves, as well as of the barge and wharf owners, such a restriction is desirable. He bases this latter assumption on the crowded state of the Thames, the sanitary condition of the water, and on the danger of collision; and he says that the excursionists would be better off if they went to and from Tilbury by rail. No doubt they would be, but then the question of expense—which is a serious one to many of them—would come in. This sudden interest in the well-being of the excursionists is suspicious on the part of people who by their own case have come to hate the sight of excursion steamers. The barge owners had better leave that side of the question for others, and stick to the point about damage. If things are as bad as they make out, restrictions will no doubt have to be put on the speed of these big paddlers, and encouragement given to build twin, or even—if the draught cannot be got down otherwise—to quadruple screws. Vessels of the latter type would run little danger of collision, for they can spin round almost like teetotums, as anyone who has watched even the heavy luggage boats of the Wallasey Ferry on the Mersey can testify.

One of the most Extraordinary Narratives

that ever came before even one of the Courts of Inquiry held by order of the Board of Trade has just been reported. It involved the loss of a vessel which a quarter of a century ago was one of the most famous that traversed Eastern waters. Even at the time of her final end she was in every respect, according to the finding of the Court, well equipped and in good condition. The company whose flag she had carried throughout her long career disposed of her to a Bombay firm, and, within a week, she was a wreck. It appears that the Bombay shipowners were so delighted with their new acquisition that they asked a large party of nearly 300 guests, including some 25 Europeans, to take a trip in her to a neighbouring port, where one of the owners resided. A British certified captain was given command of the steamer, and he had under him certain European officers. The trip commenced, and all went well until the vessel got near her destination. Here it was necessary to be careful indeed, for they were drawing about 18 ft., and the chart in places only gave a couple of fathoms; but the vessel, though she had a leadsman in the chains, went on at speed, though she was in a position too near the shore, and where a vessel one quarter her size should not have ventured. She not unnaturally took the ground. All on board were fortunately got ashore, but attempts to float the ship failed. An inquiry being ordered, the captain did not attend, and was eventually brought in on a warrant; but he obstinately refused to answer any questions. There was no log kept, and the second officer, quartermaster, and leadsman had all gone away and left no trace, and so the real facts as to courses, &c., were very largely left to the imagination of the Court. Under the circumstances they suspended the captain for two years. This is a very heavy sentence, but, under the circumstances, it is hardly to be wondered at that the Court felt bound to inflict a heavy punishment. It should not, however, be forgotten in extenuation of the captain's conduct, that he was undoubtedly giving personal attention to the navigation of his vessel, and that he had his owner standing by his side on the bridge, presumably encouraging him to get as close in to the shore as he could.

The Americans

appear to be doing all they can to discourage the Atlantic passenger traffic. The fine Warren Line steamer *Canada* has got into serious trouble with the harbour authorities at Boston because she carried more passengers than her American certificate allowed. The fact appears to be that when she originally came out from the builders it was not contemplated that she would be so purely a passenger ship as she now is, and accordingly she has had her original accommodation increased. When at Boston after the alterations the proper notices and documents were not given and obtained, and so, after threats of imprisonment, the captain has been fined. Now it appears that in future captains sailing from Boston will have to make affidavits as to the passenger capacity of their ships.

The *Canada's* experience is aggravating enough, but the trouble arising from the new Tariff law, which forbids the entry into the country of wearing apparel in excess of a value of twenty pounds per passenger, is a petty annoyance which will do much to discourage purely pleasure traffic. The limit fixed is so low and the cost of wearing apparel in the States is so high that very few people can escape. The whole matter becomes inquisitorial and indecent when we hear that the baggage of ladies is to be overhauled by the customs searchers and inventories made of the contents, with an appraisement of each article in the margin.

Ventilation for Ships.

The subject of ventilation of ships, like the almost equally important subject of the ventilation of buildings on land, has not, till recently, had anything like the attention which it deserves. Ventilation of houses on land, though certainly important, cannot by the nature of things be so utterly dependent on art as is that of ships. For the house

stands, except perhaps as to its basement, entirely exposed to the air. Doors and windows do not fit with mathematical exactitude, especially in those houses which are built by the jerry builder with bricks and mortar of a very porous character, and with doors and window-sashes of unseasoned foreign timber. But at sea things are entirely different. The iron or steel skin must be absolutely imperviable, any openings that are made in the sides must be capable of being closed with the strongest scuttles working in indiarubber rings, and shortly, what we may call accidental ventilation, on which most of us depend on land, is absolutely impossible at sea. The result has been that the atmosphere of sea-going vessels, in anything approaching bad weather, has become proverbially offensive. This, no doubt, has been one of the causes of sea-sickness to the passenger, and even if it has not actually in all cases produced sea-sickness, it must be detrimental to health for a passenger to be confined for long periods of time in a fœtid atmosphere. Thus some attention was necessarily called to the subject, and bell-mouth ventilators in large quantities were placed on board passenger vessels. These had to be turned to catch the wind, and the pressure of the breeze was relied on to force air down into the lower parts of the ship. No means was taken to get rid of the foul air, which had to escape as best it could. Thus not even the maximum amount capable of being received by one of these old-fashioned ventilators was obtained, because much of the energy available was wasted in forcing used air out.

Again, as the speed of a mail steamer increased, a head wind could generally be relied on and considerable force became available to drive air downwards through the cowls. But the area of cowl exposed must have been sufficient to be a considerable hindrance to the speed of the vessel. Yet, even these matters are not the chief objection to bell-mouthed ventilators, for they are at best only a fair weather contrivance. They admit water quite as readily as air and therefore in bad weather, when they are most needed, they fail utterly. Thus, apart from discomfort to passengers, serious loss was inflicted upon owners of ships and cargoes by damage done through heating, and in some cases the loss of the vessels themselves and of the lives of those on board have been due to absence of proper ventilation. Mr. Boyle's system of ventilation, however, remedies all this. There is no necessity to force down the air because it provides, as any rational system must provide, upcast shafts for the removal of foul air as well as down cast shafts for the introduction of fresh air. There being now no forcing to make room for fresh air larger quantities will naturally go in. The great cowls which retarded the ship's way are dispensed with, and, most important of all, the intakes and outtakes, though freely open to air are impervious to water. Thus even in the roughest weather the ventilators remain open and at work. The ingenuity of the arrangement is very great, and there is no doubt that Mr. Boyle has solved the problem of making a foul weather ventilator. Testimonials from leading scientific men set this forth. But perhaps more valuable testimony is the fact that all the leading navies of the world and most of the great steamship lines have adopted the system. The speciality is not, however, one which appeals merely to the owner of gilt-edged ships, the humblest carrier of coal will find its value. For cattle steamers and for such perishable cargoes as fruit it is very necessary, and many times the cost of an installation may be lost on a single voyage in bad weather by adhering to the older haphazard system.

Mr. Boyle, who carries on business both in London and Glasgow, has just issued an illustrated pamphlet giving prices and full details as to the working of his system, which seems to justify its claim to be the "natural" one, for instead of ceasing to work in stormy weather, when it is most needed, it, owing to the increased air-current, works more efficiently than at other times.

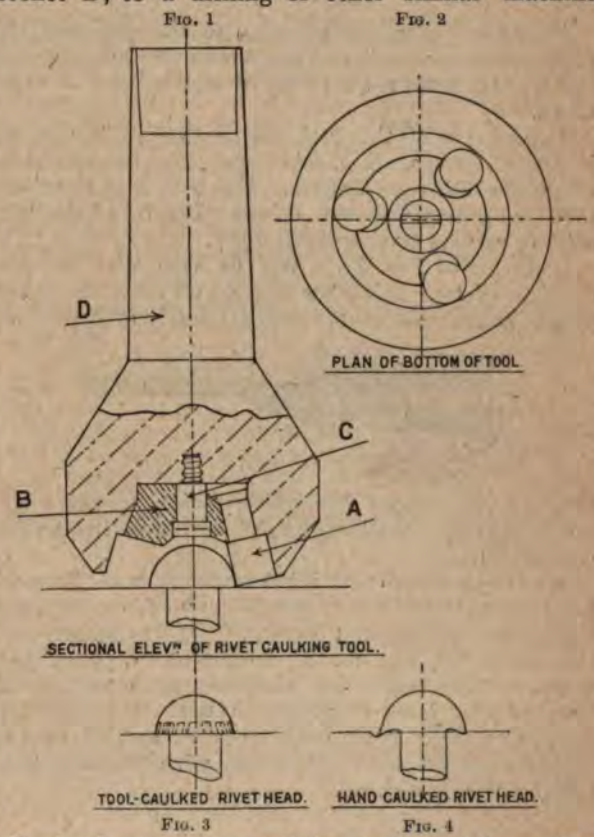
Mr. J. I. Thornycroft has been unanimously elected, on the nomination of the Master, Sir William H. White, to the freedom of the Shipwrights' Company.

Engineers' Dispute.—A meeting of the leading ship repairing firms on the river Thames took place on Wednesday, August 18th, at the Cannon Street Hotel, to consider the desirability of their joining the Federation of Employers. These repairing firms have conceded the demands of the men for 9 hours pay for 8 hours work, but if they join the Federation, it will involve their re-adopting a 9 hours' working day.

MILLAR & SHARKIE'S RIVET-HEAD CAULKING TOOL.

THE present method of hand caulking rivet heads of boilers has many objectionable features, and it is with a view to overcome these that Messrs. Millar & Sharkie, of 3, White Street, Partick, Glasgow, have designed and placed on the market a very ingenious tool for the purpose, which we illustrate in the accompanying diagrams. From these it will be seen that the tool consists of three rollers A, placed at equal intervals on a live ring B, which is adapted to revolve with the rollers round the pin C. The rollers are kept in position by having a countersunk head at their upper end, which engages behind a suitable shoulder formed on the ring and holder.

The method of using this tool is to attach it by the socket D, to a drilling or other similar machine,



allowing it to revolve, and then to force it forward on to the rivet-head. The rollers immediately begin to revolve on coming in contact with the rivet, and roll down the edge of the rivet-head until they touch the plate. The rivet-head will then have been pressed hard down to the plate all round, and any rag adhering to it is removed.

Fig. 1 of the diagrams is a part vertical section of the tool; Fig. 2 is a plan as seen from below; Fig. 3 shows the appearance of a rivet-head caulked by the tool, and Fig. 4 a rivet-head caulked by hand.

It is claimed that this method of caulking does not slacken the rivet or damage the plate, and is efficient, rapid and inexpensive to carry out. The work is rendered perfectly watertight, and at the same time a uniform appearance of finish and neatness is obtained

SIMPLEX IMPROVED TUBE CLEANER.

EVERY effort nowadays is made to improve by all available means the efficiency of steam boilers as a transforming device for energy, and great attention is given to the matter of maintaining the transmitting surfaces as clean as possible. This has become all the more important on account of the large power demanded per unit of weight of boiler, of the high pressure of steam carried, and the high rate of evaporation so prevalent in the boilers of the present time.

Fig.

We have pleasure in bringing to the notice of our readers a very simple and ingenious tool for removing the deposit from the interior of the boiler and other tubes.

Three types of this tool are illustrated in the adjoining diagrams. Fig. 1 is the tool for use in marine and other fire-tube boilers. Fig. 2 is a quarter disc tool for use in water-tube boilers. Fig. 3 is a modified form of scraper having three discs.

Referring to Fig. 1, it will be seen that the tool consists of two half discs carried on the ends of two hinged arms. These are automatically expanded on

Fig. 2

drawing the scraper through the tube, by the wedge pin carried by the sliding sleeve to which the handle is fastened.

It is to be noted that this scraper does all its work when being pulled out of the tube, and in consequence is easy on the fireman; further, it brings all the soot and scale into the smoke-box instead of pushing it back into the combustion chamber, as is usual with tools of this kind at present in use. It cannot jam itself, as a slight push back frees it, and it can be brought against the obstruction with renewed force till the tube is cleared.

Fig. 3

For water-tube boilers the scraper with quarter discs, as shown in Fig. 2, is first used, and is then followed by the full disc scraper, as shown in Fig. 1.

The scraper shown in Fig. 3 is arranged with three one-third discs, fitted to three expanding arms, so as to secure the uniform and equal contraction of disc to allow the tool to pass through the tube regardless of scale. When the scraper passes out of the back of the tube, it is guided in again on the return motion by the webs arranged upon the arms and discs and is immediately expanded by the action of the wedge and sleeve.

These tools are put on the market by Messrs. Bromell & Co., of 7, Thomas Street, Liverpool.

NAVAL MATTERS—PAST AND PROSPECTIVE.

From our own Correspondents at home and abroad.)

THE Naval programme recently set forth by Mr. Goschen appears to have met with the cordial approval of everyone, and what few criticisms were offered were purely on matters of detail and of a friendly nature. It is proposed to lay down four battleships, three of the *Majestic* class, to be built at the Royal dockyards, and one of the *Canopus* class, to be built by contract, in addition to the new Royal yacht and some other small craft. There need be no longer any question of Britain's sovereignty of the seas if such a policy continues, as there is every prospect of it doing while the present Government lasts. The generosity of the Treasury, too, has called forth much favourable comment, and its gift of half a million sterling to the First Lord to do whatever he thinks best with in the way of augmenting the naval defences of the country, will always remain a gratifying incident of this era of naval activity. The Government are clearly resolved that the fleet shall be unapproachable in both strength and numbers by any Power or combination of Powers in Europe, or in any other part of the world. The intention expressed, too, of building several new fast armoured cruisers will meet with the hearty approval of all who have made a study of the conditions which would prevail were this country involved in war with any other first-class Power. It will readily be understood how extremely useful these vessels would be in such a case to set free other cruisers to protect the commerce of this country, at which a blow would certainly be struck.

Additions to the Fleet.

The displacement of the new battleships will be practically the same as that of the *Majestic*, but their speed will be greater and draught somewhat less. The number and calibre of the guns will be the same, but they will be made superior in power, while the armour of the new ships will be of an improved quality. As Mr. Goschen said, "In no single feature will these vessels fall short of the *Majestic*, while they will have a smaller draught of water, and they will have more powerful guns, besides which, for their protection, we are using new armour of a calibre more efficient than that of the *Majestic*." The cruisers are to displace 11,850 tons, and will combine the armament of the *Powerful* with the armour of the *Canopus*, and are to be wood sheathed and coppered, so as to be able to keep the seas for a long period without any serious loss of speed. They are to have a continuous sea speed with smooth bottoms, of 19½ knots, although on the measured mile they are to attain 21 knots or thereabouts. In these vessels naval men will have what they have long been asking for. It is also proposed to add to the existing fleet of torpedo-boat destroyers four new vessels, and another feature in this programme which calls for approbation is that the new Royal yacht is to be a yacht and not a hybrid combination, like the vessels which the Powers of Russia, Germany, and Italy affect. Continental dockyards have been more than busy during the last year or so, although in the case of one or two countries the ships built have not turned out the successes which were anticipated. The improvement in nickel steel has removed the difficulty which was felt in providing suitable armour for the sides of cruisers, and it is hoped that the new vessels of this type will be provided with armour well calculated to protect the vital parts of the ship from injury by shell-fire. In short, it is granted on all sides that the money voted, or rather given, could not have been spent in a more able and thoroughly practical manner.

The Merits of Submarine Boats.

Mr. J. P. Holland, the designer of the submarine boat of that name, which has just undergone its trials, has contributed an interesting article to one of the American magazines on the subject of what such a boat is capable of doing. Apparently he considers it an excellent vessel for harbour defence duty. The boat, he says, should be outside the outer line of harbour defence,

that is, beyond the range of the guns defending the entrance. While performing this duty it will lie awash. On the approach of an enemy's vessel the smokestack will be unshipped, and the aperture on top of the turret through which it passed will be quickly closed watertight. She will then run in a direction to intercept the enemy's ship, still remaining in the awash condition until she comes near enough to be discovered by the lookouts on the ship, when she will go from the awash to the entirely submerged condition. If the pilot finds that the submarine boat is within safe striking distance, say 100 yards, a Whitehead torpedo is discharged at the ship. A heavy explosion within six seconds after the torpedo is expelled will notify the operator that his attack has been successful, and he may then devote his attention to the next enemy's ship that may be within reach. The preparations for the attack are calculated to take up 30 seconds from the time when the boat is in the awash condition and ready to dive. The idea of advocating their use as harbour defence vessels is certainly a wise one, for this is about the only possible use they could be put to, but it is a question whether the explosion of a Whitehead torpedo 100 yards away would not result in almost as much damage to the attacking party as to the attacked.

The "Pegasus," "Pyramus," and "Pactolus."

These three cruisers, which have been under construction in the yards of Messrs. Palmer & Co. and Sir W. G. Armstrong, Whitworth & Co., are expected very soon to be ready for delivery at Devonport, where they will be completed. Messrs. Palmer & Son, who have constructed the two first-named, have been busy preparing them for this event, as have also the Elswick firm with the *Pactolus*. They will go to the dockyard by their own steam, but, despite this, a lot of work yet remains to be done to them. The dockyard alone is expected to spend some £21,000 in preparing them for sea, and the contractors have also plenty to do to them before they have finished with them. They are three of seven vessels ordered by the Admiralty last year, and their dimensions are as follows:—Length, 300 ft.; breadth, 36 ft. 6 in.; mean load draught, 13 ft. 6 in.; displacement, 2,325 tons. They are guaranteed to develop 7,000 I.H.P. with forced draught, and to have a mean speed of 20 knots on a four hours' run. On an eight hours' natural draught trial the contractors have guaranteed an I.H.P. of 5,000, when a speed of 18½ knots may be expected. As regards their armament, each ship will be supplied with eight 4-in. and with eight 3-pounder quick-firing guns, and with machine-guns of the Maxim type, and Whitehead torpedo tubes. The two vessels not yet ready are the *Perseus* and *Prometheus*, now building at Earl's shipbuilding yard, and which will be sent to Sheerness to complete. The whole five are to be ready to hoist the pennant by the end of November, when they will most likely be sent on foreign service. The cost of building the *Pactolus* will be just over £144,000, the *Pegasus* and *Pyramus* just over £139,000, and the *Perseus* and *Prometheus* just over £133,000, a slight difference to the cost of the *Proserpine*, £160,000, now building at Sheerness.

Trial of a New Torpedo.

News to hand from Auckland states that a new torpedo, the invention of Mr. J. F. Perkins, Ponsonby, has recently been tried. A very large number of interested persons witnessed the trial, which was carried out in the harbour. The torpedo is propelled and steered by electricity, contained in a powerful electric motor, worked from a storage battery in the interior of the torpedo. In with this the steering and other gear is also enclosed. The model for the trial was not supplied with storage cells, and electricity was therefore supplied from a dynamo on a boat near by, the wires being paid out as required. Many tests were made, and the course in which the torpedo travelled was different each time. It is claimed by the inventor that his torpedo is capable of travelling from six to eight feet below the surface of the water, and will rise and explode at any given time without having become visible beforehand. Its weight is said to be only half that of an ordinary torpedo, an arrangement which will enable a vessel to carry just twice as many as usual. The steering gear too can be set to any course, and it is claimed that this machine has a much wider range than any other. Those present, who included many prominent naval men, were said to have been favourably impressed with the invention. Its advantages over other torpedoes cannot be altogether manifest until in actual practice it gives equally good results as in this unofficial trial. The advantages claimed are that by sinking to the depth mentioned it will show no visible indication of its course, its wider range will also be in its favour, and in addition to this the added number of such missiles a vessel will be enabled to carry.

Torpedo-Boat Destroyers for Foreign Service.

It is the intention of the Admiralty to strengthen the squadrons on foreign service by a number of torpedo boat destroyers, a step which has met with much favourable comment. These craft have proved themselves to be valuable additions to the fleet and the Admiralty have determined to make use of them wherever practicable. In the course of the last three years or so some ninety boats have been completed and delivered, and now that we have a sufficient number the suggestion that it would be well to maintain on all our foreign stations a number of these destroyers is apparently to be carried out. Five of these useful craft are already in the Mediterranean, the *Ardent*, *Banshee*, *Bruizer*, *Boxer*, and *Dragon*. These were sent abroad some twelve months ago, and have proved themselves of value as instructional tenders to the battleships of their respective squadrons. To these will now be added six more destroyers, two from each of the three home ports. From the Devonport Reserve the *Rocket* and *Virago* have been chosen. The first-named is an early type of torpedo-boat destroyer and her maximum speed is 27 knots. The *Virago* has only recently been completed and is able to get up a speed of over 30 knots. They rendered a good account of themselves in the recent naval manœuvres. Some slight alterations and repairs in their equipment is necessitated by their journey to the Pacific. The *Quail* and *Sparrowhawk* are destined for the West Indies, and from Portsmouth the *Whiting* and *Bat* leave for China. The Mediterranean flotilla too will probably be strengthened in this direction, the *Foam* most likely being one of the vessels chosen for this purpose.

The Japanese Navy.

The ceaseless energy of Japan in the matter of the building war vessels and her ambition to be possessed of a navy which will be capable of commanding respect for her flag is notorious, and now she will shortly have ready another battleship, the *Yashima*. This vessel has been designed and built at the Elswick Works, and is now practically completed, therefore it will not be long before she leaves the Tyne for the far East. She was laid down over two years ago, in the early part of 1895, and launched just about a year later. Her dimensions are as follows:—Length, between perpendiculars, 372 ft., with a breadth of 73 ft. 6 in.; mean draught, 26 ft. 3 in.; displacement, 12,320 tons; guaranteed speed, natural draught, 16¼ knots per hour; forced draught, 18¼ knots; full coal capacity, 1,200 tons. As regards her armament it is an extremely powerful one, inasmuch as she carries four 12-in. 49-ton guns, placed in pairs in two barbettes; ten 6-in. quick-firers (four in casemates on the main deck and six on the upper deck), 24 3-pounder guns, and five tubes for the discharge of torpedoes. The battleship is protected by a waterline belt, extending over two-thirds of her length, which has a depth of 8 ft., and varies in thickness from 18 in. to 14 in. All this armour is of Harveyed steel. She has a complete protective deck 2½ in. in thickness over her whole length. Her machinery has been supplied by Messrs. Humphreys, Tennant, & Co., and the armament by Messrs. Armstrong. She is a sister ship to the *Fuji*, completed at the Thames Ironworks, and which was one of the features the Naval Review.

The Use of Wood in our Warships.

It is generally believed that in all the vessels now building the use of wood will be resorted to as little as possible, as such a mass of inflammable material on board is reckoned highly dangerous. It is a lesson that was taught us by the battle of the Yalu, in the China-Japanese war, that officers and men are in almost as much danger from flying splinters from the wreckage which would assuredly result from an exploded shell as from the shell itself. Many of our newest warships, however, have still a great amount of wood on and between decks. Of course there are still purposes for which wood is absolutely necessary, but much of the wood used for the cabin fittings of many vessels could certainly be dispensed with, although before a fight much of this would doubtless be thrown overboard. Foreign navies appear to be more go-ahead in this matter than we are. France, for example, has resorted to linoleum, and for some time past has been busy removing from her battleships and cruisers a good deal of the woodwork which would be exposed to the

Germany is doing the same, and has even gone so far as to try iron furniture in the wardrooms, but the experiment proved a decided failure. The United States have been trying a kind of non-inflammable wood, experiments with which took place over here some time ago, but whether it has been a success or not has not yet transpired, very little having been heard about it lately. But, although this wood may be rendered impervious to fire, it has not been prevented from splintering, and therefore it were better that wood of any kind should be used as little as possible in the ships we are now building.

The French Shipbuilding Programme.

The outcry made in France about the state of the Navy appears to be justified, if we are to believe the reports which have reached us of breakdowns in machinery, &c., which have occurred on the French vessels during the last month or two. But these failures do not appear to stand in the way of new construction, for at the present time our neighbours have something like fifty ships in hand, more than half of which are being constructed at private yards. The Navy Estimates of France for 1898 represent an increase of more than one million sterling on those of the present year, and a great part of this increase will be spent on new construction. The Northern Squadron is to be strengthened, but some economy is to be effected in the Mediterranean. Part of the money, too, is to be expended on the fitting of watertube boilers to vessels which are at present not fitted with such improvements. Fourteen new vessels are to be laid down, two of them to be battleships, which will cost about 28,000,000 francs. It is noteworthy, too, that French naval men are vigorously taking up the subject of torpedo attack, and it is the opinion of many of our own great naval authorities that in the next great war the torpedo and the ram will play a very important part, and that, therefore, the Frenchmen are acting wisely. The agitation for an improved Navy seems to be making good headway, chiefly owing to the efforts of M. Lockroy and his friends, and it therefore behoves us to look facts in the face and not, because we had a magnificent show at Spithead, to relax our efforts as regards building and increasing our reserves of men in the least.

Aerial Torpedoes.

The discussion which has arisen as to the merits and demerits of Mr. Hudson Maxim's aerial torpedo has not yet settled down. According to the inventor, the system which he advocates of throwing aerial torpedoes is not confined to use upon any particular sort of torpedo-boat or cruiser, neither is the torpedo gun, nor the aerial torpedo confined to any particular calibre, but torpedo guns may be employed with equal efficiency in any position where any other guns of whatever size are used. Large guns, throwing immense masses of high explosives, may be employed for the destruction of battleships and coast fortifications and heavy-armoured cruisers. Light, quick-firing torpedo guns may be used upon torpedo-boats and torpedo-boat destroyers in place of the present patterns, and the destruction these weapons would be capable of doing admits of no comparison with the present types of quick-firing guns. Upon the battleship if they are to be employed at all; then heavy long-range torpedo guns, throwing from half a ton to a ton of high explosives, backed up by quick firing torpedo guns, would be her best armament. Upon the light-armoured cruisers, or commerce destroyer, similarly would an armament of large and small torpedo guns be her best weapons. After this Mr. Maxim declares that he is a friend of England, and would like the authorities to adopt his invention. Nowadays none of the new vessels which are being built are provided with above-water torpedo tubes on account of the danger which surrounds them, and therefore we doubt whether this invention of Mr. Maxim's will find as much favour in the eyes of the British Government as he could wish for.

The Launch of the "Canopus."

Towards the end of this month it is expected that the *Canopus*, which is now on the building slip at Portsmouth, will be ready for launching. The ways have been laid down some time now and the cradle is almost finished, and the vessel itself is in a well advanced stage of completion. As regards her armour she is certainly behindhand, but this matter is rapidly being set right. It was originally proposed to fit her with stern torpedo tubes, but this proposition has since been abandoned in favour of submerged tubes. Her bows, too, are to be covered with 2 in. hardened nickel steel instead of being sheathed in wood, as in the case of the *Majestic*. Her main armament will be composed of 6 in. Harveyed nickel steel. She will displace, when finished, 13,000 tons, and is 390 ft. in length, with a 74 ft. beam. The building slip which she will vacate will, as far as is known at present, be taken up with one of the new battleships which Mr. Goschen proposes to built out of the half-million given him by the Treasury. It is worthy of mention that these vessels will be fitted with water-tube boilers.

Shipbuilding Progress and the Engineering Strike.

The strike in the engineering trade, which has dragged on for so long, will, it is hoped, very shortly reach a settlement. It is a dispute which every patriotic citizen will wish at an end, as it certainly adversely affects national interests. It is a strike too which is felt in the royal dockyards to some effect, as one or two incidents which have happened during the past week or so have prominently brought forward. The steam trials of the *Arrogant*, for instance, were somewhat delayed, and but for Government employés getting to work on the *Mars* in place of the contractor's men, who had refused to work, that vessel would still have been behindhand with her fittings, etc. Of course, Messrs. Laird Bros., the contractors, had to pay for this, but other equally important work had most likely to be postponed on this account. The engine fitters at work upon the torpedo-boat destroyers, *Chamois*, *Bat*, and *Star*, stopped work too at the bidding of the Amalgamated Society of Engineers. Mr. Yarrow has written a letter to the firm's employés, and the conclusion reached after a perusal of it is, that such a state of affairs is highly detrimental to the interests of the country at large. He asserts that foreign competition has already to some extent undermined his business, and that but for this competition his firm would recently have been enlarged, and so given employment to an increased number of men. He is resolved not to give way to the strikers, and they in their turn seem resolved to stand to their guns, and the result is a deadlock which will delay the completion of many of our war vessels, and drive much of our shipbuilding trade into the hands of foreigners.

Portsmouth Dockyard.

Work on the several vessels in hand here makes good progress, but of the three ships in hand, the *Canopus* is adding to the weight of metal built into her faster than the other two, the *Gladiator* and *Cæsar*. It is just about seven months now since she was laid down, and it is calculated that about 4,000 tons of material have been put into her up to date. This is an excellent performance. She is well advanced astern and forward also, for she has had the guard stanchions of the forecastle in position for some time. The *Gladiator* at present has plenty of men at work upon her. It is curious to notice the way in which men have been drafted backward and forward to this ship. If another vessel is in need of men they are taken from the *Gladiator*, and when there are men to spare they are sent to the *Gladiator*, so that her progress is somewhat uncertain, although it is not altogether unsatisfactory. A good deal of her machinery has been delivered, but she is still waiting for her boilers. The strike in the engineering trade may be partly responsible for this. The gunboats *Medway* and *Medina*, which have lately been re-armed here, will, it is hoped, have good weather while on their voyage to Bermuda; but fine as it may be the trip will not be wholly pleasant to either officers or men, especially the latter. Both vessels are inclined to roll in a choppy sea, and now that the two 47-in. quick-firers have been mounted forward, they have brought them down at the bows, which will not tend to decrease this tendency. The journey it is expected will take some three or four weeks, if the weather conditions are favourable, for a 5-knot speed is as much as can be expected from these old crafts. The engineers strike has had little influence on this yard.

Devonport Dockyard.

Progress on the vessels building or under repair here has been steadily maintained during the past month. The growth of the *Ocean* progresses apace, some 3,000 tons having been built into her since she was laid down, an average of about 125 tons per week. Comparisons between the progress of the *Ocean* and *Canopus* are often being made, but although the latter vessel was commenced some six weeks earlier than the *Ocean*, this ship is only a few hundred tons behindhand now. Unforeseen delay in the delivering of the stem and stern pieces for her, as well as the armour plates, have been partly responsible for this. Much was said about the quantity of material ready to hand to be worked into the *Ocean* when her keel was laid, but the *Canopus* was commenced six weeks earlier, and now she has had another

fillip forward. Vice-Admiral Sir John Fisher seems to be making the *Renown* extremely comfortable for his journey to and sojourn at the North American station. A great deal of money has been spent upon her since she returned from the Naval Manœuvres, and the original cost of completing her for foreign service will be considerably increased. Several of the ships specially commissioned for the Review have been paid off, and of the ten pennants or so which have been lowered, each vessel has put in a list of small defects which are being attended to as fast as circumstances will permit. The boilers of the *Blanche* appear to be in a very bad condition, far worse than was anticipated. Of the new programme we have been allotted a battleship and an armoured cruiser to build. The battleship will be commenced on the slip which the *Ocean* will vacate in about two months time, and the cruiser near by.

Chatham Dockyard.

The basins here are nearly all of them engaged with the commissioned ships returned from the Naval manœuvres, and generally work is in full swing. A week or so ago the Steam Reserve shops were busy, and the crews of these vessels were hard at work returning their stores to the dockyard, and getting the ships ready for paying off. The *Andromache*, *Diana*, *Isis*, *Apollo*, *Thetis*, *Dido*, *Tribune*, *Terpsichore*, *Sapph*›, *Venus*, *Warspite* and *Brilliant* have all paid off, and have been removed to their different basins. The *Theseus*, *Endymion* and *Minerva* have been in hand in order that they may be brought forward for commission. The *Empress of India*, too, required a good deal of attention, and several gangs of men were necessary to carry out the repairs which were necessary before she could leave for the Mediterranean, where she is to relieve the *Rodney*. This vessel will return home, and it is expected will come to this port for repairs, before she again hoists the pennant to take the place at Queensferry of the *Edinburgh* as coastguard ship. The postponement of the trials of the *Illustrious* is due in a great measure to the strike in the engineering business, but her top shield for the after guns, and the barbette gun fittings are now in position, and the dockyard people are hurrying on the work as fast as they possibly can. Mr. Goschen's recent statement as regards the Navy has dispelled many fears which were entertained here that the full strength of this and other yards would not be maintained.

Sheerness Dockyard.

The refitting programme of this yard is a pretty extensive one. It now transpires that the sloop *Dolphin* is likely to hoist the pennant again, this time as a training ship for boys, and as far as can be ascertained, the proposal to remove her machinery and fit her up as a sailing ship is even now under consideration at the Admiralty. It will be remembered that her sister ship, the *Wanderer*, met with pretty much the same fate. The name of the *Dolphin* was down on the refitting programme of last year, but the work was never commenced, and if she has this year to be fitted out as a sailing vessel the work will be done at this yard. The cruiser *Satellite* has lowered her pennant, it is believed, for the last time, and her name will shortly be removed from the list of effective vessels. The removal of her guns and mountings has been carried out, and she has now for companions the *Caroline*, *Tourmaline*, *Ruby*, *Garnet*, and *Gastor*, all of which have long been discarded as unfit for further service, and are only waiting for orders to be sold to the shipbreakers. The *Wrangler* has been refitted here, and is now ready for boom defence service at Southampton. The five obsolete gunboats, *Mistletoe*, *Banterer*, *Firm*, *Watchful* and *Grappler*, have been made part of the Medway boom defence. The destroyers, *Sturgeon*, *Haughty*, and *Snapper*, have been undergoing a refit here prior to their instructional cruise. The *Pomone* will not be launched until November now, but work on her will be carried on more vigorously. The *Proserpine* was kept back by the non-arrival of her machinery to time, but work on her is now going on more actively, for she is to be completed by the end of the present financ al year.

Pembroke Dockyard.

As far as can be judged at present it is only a matter of about a week before the *Hannibal* leaves here now, for the vessel is in a very forward state. An estimate of the cost of completing her has been taken, but the amount which will be required for this purpose has not yet been made out. Both her masts are now in position, her military tops are fitted, and the rigging of the ship has received the attention necessary, and is now practically finished. The gangway or bridge which has been constructed has been the means of saving much time for the men employed on the *Hannibal*, before it took them some 15 minutes to disembark from the ship in order to get more materials, &c., and with the new gangway it takes less than five minutes. Progress on the *Spartiate* continues to be fair, many tons of material being built into her weekly. The total number of tons built into her now is considerably over one thousand. It is noteworthy that the actual cost of the work on this vessel is up to the present about 23s. per ton less than the cost of the *Andromeda*, when she had reached a similar stage of construction.

The Speed Trials of our Warships.

It has often been pointed out that the speed of our battleships is much greater on paper than it is in reality, chiefly owing to the fact that the extremely favourable conditions under which a speed trial is carried out makes possible a speed which in ordinary service cannot be reached by two or sometimes three knots. A far wiser policy would be to allow the vessel to make her trials under her ordinary active service conditions, although maybe some slight delay might occur from this, but the speed then attained could be reached whenever required. There is certainly room for a little improvement in the conduct of the engineering branch of the Admiralty. Nowadays a great deal depends upon the efficiency of a ship's machinery and those responsible for its working.

A Powerful Ice-breaker.—Messrs. Burmeister & Wain, of Copenhagen, have recently built in their yard an ice-breaker which has broken all records by cutting through ice 22 ft. thick, extending over a mile. The *Nadeshuy*, as she is called, belongs to the Russian Government, and will be stationed at Vladivostock. Her length is 180 ft., beam 43 ft., her displacement equals 1,500 tons when 18 ft. in the water aft and 13 ft. forward. With engines indicating 3,600 H.P., a speed of 14¼ knots was attained on her trials. The *Nadeshuy's* frames are closely placed and of extra heavy section, the plating being ¾ in., ⅝ in., and 1 in. steel, with considerable tumble home of both sides and ends. Water tanks fore and aft allow considerable alteration of the trim, and by this means the stem can be brought up so as to draw only 9 ft., while the stern can be put down to 22 ft.

HOAR & BROWN'S HARDWOOD MARKET REPORT, AUG. 23rd, 1897.

Teak.—The landed stocks remain large, and include an unusual quantity of inferior logs; this causes some low quotations to appear, but the price for first-class wood has not altered, and is likely to remain firm for some months. Business for some little time may be reported as having been flat. The deliveries show a slight falling off, being about 10,500 loads since the commencement of the year, as against 12,000 loads for the corresponding period in 1896. The deliveries for July show an improvement, and are almost up to the same month of last year. Several enquiries are about, which will make the teak trade busy again. The demand for planks is still brisk, the deliveries for the month being well up to the average. The stock is fairly light, and prices appear firm, and at present there is no justification in the report of a downward tendency.

Mahogany.—This market has received a severe check, especially in African supplies, the values suddenly receded at least 25 per cent., in consequence of large quantities being forced upon the market, and the report of future excessive shipments. Altogether this trade is uneasy, especially since a new importation has sprung up, by name "Californian." The wood has a reputation of being wormy, which has not yet been verified. Prices asked are low, and should the wood prove to be of any value will greatly interfere with shipments from other countries. A considerable lot of Tecolutla wood has arrived lately, and there still remains one cargo to be sold by public sale in a fortnight's time. For Honduras logs of good sizes and quality the market is fairly steady. The stocks are very light, and the summer supplies being now over, make a good field for the autumn arrivals. Nicaraguan has sold fairly well right through the late depression, the wood being well squared, long, straight, and mild, helps it to hold its own among consumers. Good Tobasco is also selling well, but small logs have dropped in value, and are slow of sale. A few sound logs of Panama sold fairly well at the last sale. Cuba and St. Domingo wood are

almost exhausted, and cargoes would come to a good market at the present time.

CEDAR.—With the large stock of Paraguay and other bastard woods which bear this name, the Cedar market is in a very unsettled state; prices cannot be reported as firm, and should importations continue in any quantities there is likely to be a serious decline.

WALNUT.—Logs are cheaper and have again almost reached the lowest minimum prices, the demand is quiet and stocks are ample for present requirements. The plank trade for first quality is fairly good, and some arrivals are anxiously looked for to supply enquiries, especially for 3 or 4 inch. There is not much activity with the minimum parcels.

SEQUOIA.—Since the late sales, "without reserve," the prices have slightly improved, and some enquiries are about, but taken on the whole the trade is quiet.

WHITEWOOD.—The demand for logs is limited, and the prices for boards and planks is extremely weak, parcels being offered at unusually low figures.

KAWRIE PINE.—The principal demand is for planks, which sell fairly well at the old prices.

GREENHEART.—Stocks are small and trade very dull.

SERAYAH.—This timber is taking hold of the public for common purposes, and being free to work, combined with cheapness, it goes off quickly and gives every satisfaction. Business for the last month cannot be described as brisk, but there is every appearance of a more animated future in view.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

So far as Glasgow and the West of Scotland are concerned, events in connection with the engineering strike and lock-out on the eight-hours' question move but slowly. There can be no doubt, however, that matters are more and more settling down into a determined and protracted fight. Not only on the part of engineering firms, but of shipbuilders as well—who will shortly be brought into "the thick of it"—the spirit being displayed is one of "war to the knife." The policy of strike and "special levy" on the part of the workmen is being more than met by the counter-policy of "lock-out" on the part of the employers. With each fresh accession to the ranks of the employers, and adoption of their lock-out policy, additional burden is being thrown upon the funds of the men's association, while at the same time the sources from which monetary assistance can come are being reduced.

Negotiations with non-federated firms, not only in Glasgow, but in Paisley, Johnstone, Greenock, and other West of Scotland towns, as well as in Leith, Edinburgh, Dundee, Aberdeen, and other towns in the east, have been proceeding for some little time, and considerable success has been attained in getting firms to throw in their lot with the federated employers, and post the lock-out notices. In Glasgow especially the locomotive-building and the machine-tool making firms are numerous, and the number of employés large, and it is fully expected that these branches will fall into line very shortly. Already a number of machine-tool makers in Glasgow and Johnstone have posted the lock-out notices, and in some cases already given effect to them. According to expectations, and the information before the employers at present (23rd August), a further batch of 20 notices should be posted before another day is over, these to be followed by others—the locomotive firms, it is thought—before the end of the week. These wholesale accessions to the ranks of the employers certainly form a formidable offset to the concessions being made to the eight-hours' demand by small firms in London and here and there in the provinces.

Although ostensibly the engineering works on the Clyde are at a standstill, this is not actually so in very many cases, as, with the apprentices at work, aided by numbers of non-union engineers, matters are kept moving. But for the system of picketting and "gentle persuasion," as practised by the workmen stationed outside, many shops could be filled twice over with non-union workmen. Few of these, however, are to be found intrepid enough to carry on an engagement for more than a week or so at any one shop, owing to the attentions of the pickets, and sometimes to crowds of idle workmen outside.

The stoppage, nevertheless, has begun to tell on the other branches of industry closely allied to engineering. Iron founders, brass founders, tube makers, copper-smiths, &c., are feeling the effects of the dislocation, and men already being discharged in considerable numbers. It is only a question of time when the cessation of shipbuilding itself, and boiler-making as well, will be general all over. Many shipbuilding firms have been compelled to reduce the number of men employed, and with the labour market so unsettled the feeling is growing that it would be better—in view of the probable length of the struggle—to close their yards at once. In regard to the Clydebank establishment it has been announced that all work on board H.M.S. *Europa* will be stopped on account of the Government objecting to their work being done by inexperienced workmen, and that as an attendant consequence a large pay-off of all classes of workmen in the shipyard will follow.

A tour of the federated Clyde shipyards and boiler shops has shown that there is practical unanimity among the shipbuilders in declaring that it will be quite impossible for them to think of keeping their works in operation, under the existing state of things, for more than a month or six weeks longer. By that time they calculate that every yard on the Clyde, affected by the engineers' stoppage, will be at a complete standstill. None of them, moreover, suggest that efforts should be made by them to keep things going. They are thoroughly at one with the engineering employers in resisting the eight hours' demand "to the death," and they well know that monetary assistance is or will be, tendered from many of the trades in employment to belligerent engineers.

While this is the spirit dominating the employers, they at the same time acknowledge that the engineering workmen are as determined as themselves, and exhibit no sign of wavering. That the struggle should continue to the New Year would not greatly astonish them, as no contingency, save exhaustion on the one side or the other, seems likely to arise to bring matters to a close.

That the battle may be compromised before exhaustion ensues, is just possible. So far as the Clyde workmen are concerned the demand—and the measures taken to enforce the demand—for an eight hours' day came upon them as an unwelcome surprise. There was not, and probably is not yet, any very great or general desire for such a sweeping reduction as six hours off the working week, and there are even some who quite sympathise with the employers in resisting this wholesale curtailment of the use of their expensive working plant. The Associated Iron-moulders of Scotland, in pursuance of the ballot instituted by the Federated Trades on the question of the most desirable working week, have already almost unanimously declared in favour of agitating for a week of 51 hours. As it is known that the Associated Carpenters and Joiners and the Amalgamated Trades likely to follow, have also decided in favour of a 51 hours' week, and that the bulk of the tradesmen in the Clyde district are inclined in the same direction, there is a pretty general anticipation that at its meeting on the 4th inst., the Federation of Shipbuilding Trades will sanction a movement for the establishment of a 51 hours' week in the shipbuilding industry. The controlling factor in the balloting now going on is, of course, the Boilermakers' Society, and much interest is therefore attached to its result; but generally there seems to be little doubt as to which way it will go. In this decision there may be some outlet paving the way for compromise and settlement as far as the engineers' demand is concerned.

The position of the Fairfield establishment in connection with the conflict has been singular, and has given such dissatisfaction, it is said, that the federated employers have "expelled" the company from their ranks. The company have made no lock-out announcement whatever, and their engineers have continued to work all along, in spite of the withdrawal from the Fairfield directorate of Sir William Arroll, who took this means of protesting against the action, or rather inaction, of the company in the matter. Individual and not general interests have undoubtedly been the company's object in this instance, and one sequel to it is perhaps found in the rumour that the new battleship which the Admiralty has decided to have built by contract is likely to be placed with the company. Not having locked out their workmen, they are thus in a position to give definite guarantee as to date of delivery—a consideration which in most instances has an important bearing on the placing of Government contracts.

Clyde shipbuilders and engineers—especially those in the Greenock and Port-Glasgow district—continue to book new

orders with a celerity which on the whole is rather surprising considering the present deplorable state of affairs in the engineering world. But this is less difficult to understand when it is remembered that a feature in all the contracts is "the strike clause," which exempts builders from the responsibility of delay in delivery in such circumstances.

Messrs. Russell & Co., Port-Glasgow, whose numerous berths—all occupied at present—are no sooner vacant than a fresh keel is laid down—have booked some five or six vessels since the beginning of August. One of these is a steamer of 5,800 tons deadweight carrying capability for Messrs. G. M. Steeves & Co., Liverpool, two are of 4,000 tons gross each, one of about 3,340 tons, and one about 3,570 tons.

Messrs. A. Rodger & Co., Port-Glasgow, have also their berths well occupied, and have recently booked orders to build two steel-screw steamers, each of about 2,560 tons gross, with a deadweight carrying capacity of about 4,200 tons.

Messrs. Carmichael, McLean & Co., of Greenock, have contracted during the month to build two steam tugs, each of 100 ft. in length by 21 ft. beam, and of about 150 tons gross each, for Mr. I. Constant, London. The vessels, which are intended for service in the channel, are to be engined by Messrs. J. G. Kincaid & Co., Greenock, and are to be classed at Lloyd's 100 A. Messrs. William Hamilton & Co., Port-Glasgow, are busy in their Glen shipyard, which has been extended of late, and continue to receive fresh orders, one of which is for a steel-screw steamer of 5,000 tons deadweight capacity for London owners, and one a steamer of about 1,660 tons gross for Danish owners.

Messrs. Barclay, Curle & Co., of Whiteinch, have recently secured the contract for two steel-screw steamers, each of 3,200 tons gross, for the British and African Steam Navigation Co., and Messrs. D. & W. Henderson, Partick, are to build a steam yacht of some 300 tons from the designs of Mr. G. L. Watson, Glasgow.

Messrs. Bow McLachlan & Co., of Paisley, are to build and engine two steel-screw steamers, each about 140 tons gross, for Messrs. Paton & Hendry, the vessels being of the "well-deck" type and intended for the coasting trade. Messrs. J. Fullerton & Co., of the same town, are about to build a steel-screw steamer of 230 tons gross, also intended for the coasting trade.

Messrs. Blackwood & Gordon, Port-Glasgow, who have earned a high reputation during recent years for both twin-screw and paddle steamers for cargo, cattle, and passenger service between England and Ireland, are "in the running" for the contract to build and engine a new fast steamer for the Dublin and Glasgow Steam Packet Co. The competition for this contract has been extensive and keen, but the offers from Belfast and English builders, it is understood, have all been set aside, being too high, and success will lie with one of three firms—Messrs. Blackwood & Gordon as stated, Messrs. The London & Glasgow Co., and The Dundee Shipbuilders' Co.

The Caledonian and the North British Railway Co.'s, who have now joint interest in the steamboat traffic on Loch Lomond, are at present taking in tenders for two new swift and palatial paddle steamers, some 20 to 30 ft. longer than the vessels at present doing service on the "Queen of Scottish Lakes." Offers have been received from some five or six firms on the Clyde, and the contract will in all likelihood be fixed in the course of a few days. The vessels are to be ready early in the spring; the task of getting the vessels up the comparatively shallow and tortuous river Leven to the foot of Loch Lomond, requiring time and careful handling.

An interesting example of the highly specialized craft, for the production of which in large variety Clyde shipbuilders are noted, is the ferry steamer *Chebucto*, of 600 tons, which was tried for speed and turning power on August 12th. The *Chebucto* has been constructed by Messrs. John Shearer & Sons, Kelvinbaugh, Glasgow, to the order of the Ferries Commission of Dartmouth, Nova Scotia, and the contract was placed on this side of the Atlantic, after competition with Canada and the United States. The vessel is intended for vehicular and passenger traffic from Dartmouth to Halifax, a distance of about eight miles, and is 140 ft. length over all, 50 ft. breadth extreme, and 13 ft. 7 in. depth moulded. In spite of her great breadth of deck the moulded beam of the vessel is only 33 ft., the hull being on very fine lines and swept outwards above water to meet the extreme width of deck. What in ordinary vessels would be the wings or sponsons of the vessel, supported on diagonal struts, is in this case an integral part of the structure supported by the outward sweep of the ship's frame and planting. On the wings are two spacious houses extending for three-fourths of the vessel's length, and these are seated and otherwise fitted for over 220 passengers. These houses, which extend to the outside of the wings, are very lofty and are pierced by two rows of large square windows. This, and the presence of a hurricane deck, with round pilot houses at each end and a shade deck over all, imparts to the craft a striking exterior, and this and other peculiarities of construction formed the subject of curious comment by crowds of onlookers as the vessel passed down the river and firth.

Both ends of this novel vessel are alike, and a screw propeller of 8 ft. diameter and a large rudder are fitted at each end, both being driven while the vessel is in progress. This constitutes one of the many peculiarities of the design, which in its main features is of distinctly American origin. The primary object of the screw at each end working simultaneously seems to be the ease and promptitude with which stopping and manœuvring can be effected more than for augmentation to the speed. Indeed it was brought out in the trials on Thursday that the speed was but little diminished when the two sets of engines employed to drive the screws were disconnected and the vessel driven by the aft propeller only. The forward and the aft screws are driven by two pairs of compound surface-condensing engines, made and fitted by Messrs. McKie & Baxter, of Copeland Works, Govan, steam being supplied from two boilers of Admiralty type. The engines are reversed by direct-acting steam gear on a new principle, the invention of Messrs. Baxter & Donald. Pumps and other auxiliary engines, of which no fewer than 15 are on board, are all self-contained and detached from the main engines. On the measured mile at Skelmorlie, the steamer, with both bow and stern propellers working, attained a speed of ten knots, which, for a vessel of her novel description was considered a thoroughly satisfactory performance. After the sheathing and staying, &c., of the *Chebucto's* superstructure by the builders the voyage across the Atlantic will be begun, and in view of her novel construction this will be watched with some interest.

Messrs. William Simons & Co., of Renfrew, during the month launched and tried for speed the powerful twin-screw tug *Hotspur*, produced to the order of the London and India Docks Joint Committee. The vessel, which is 114 ft. in length over all by 22 ft. beam, is noteworthy as being the first Scotch-built steamer fitted with Babcock & Wilcox's patent water-tube boilers. When tried on the Firth of Clyde on the 18th ult. the boilers worked throughout the whole day's steaming with the utmost satisfaction, supplying steam of 200 lbs. pressure to two sets of compound high and low pressure engines, which indicated on trial about 900 H.P., the revolutions in each case being 125 per minute. The hull and machinery have been constructed under the direction of Mr. H. F. Donaldson, Engineer-in-Chief, London and India Docks.

The formal opening of the new dock at Cessnock will take place on the 10th prox. the "star" performers on the occasion being their Royal Highnesses the Duke and Duchess of York, who will at the same time lay the foundation stone of Glasgow's new Art Galleries. In this connection it has been determined by the Clyde Trust to change the name of the dock—which has been gratuitously and naturally spoken of as "Cessnock," from the name of the estate on which the dock has, for most part, been formed—to the Prince's Dock, out of compliment to H.R.H. the Prince of Wales, who had been first asked, and who originally intended to open the dock. The huge graving dock in connection is fast drawing to completion.

The Clydebank Engineering and Shipbuilding Co., Limited, whose purchase of the extensive tract of land to the west of their engine works has already been noticed in this column, have now staked off the land acquired and building operations are about to commence. It has been rumoured that the company have under contemplation the formation of a large graving dock, in which the vessels of war, which now form so considerable a part of the work undertaken by them, may be docked at will; docking in the case of such vessels being more a feature than in the case of mercantile shipping.

Lloyd's Register Society in its Glasgow engineering branch is about to lose the services of Mr. C. E. Stromeyer, who has been appointed chief engineer for the Manchester Steam Users Association in succession to the late Mr. Lavington S. Fletcher, who had held this appointment from the formation of the Association. Mr. Stromeyer, who is a graduate of the Royal Technical College, Aix-la-Chapelle, and has been for a number of years on the Glasgow staff of Lloyd's, is the author of an able treatise on

steam boilers, and is well known in Clyde engineering circles. His departure from Glasgow will leave a distinct blank in the debating power of the Institution af Engineers and Shipbuilders in Scotland, especially on questions concerned with boilers and their uses. Besides being a member of the Scottish Institution, Mr. Stromeyer is a member of the Institute of Naval Architects and of the Mechanical Engineers.

The subject of early Clyde steamers is of perennial interest to Clydeside residents, and in scarcely less degree to all interested in the rise and development of steam navigation, and at the present time when the magnificent modern river-boats are in full swing in "the birth-place of the steamboat" some facts of historic interest are being elicited by correspondents in the Glasgow press. Regarding the *Comet*, built in Port-Glasgow in 1811-12, and the first steamship in Europe successfully employed, one correspondent corrects the impression that the vessel was lengthened by its owner, Henry Bell, at Helensburgh in 1813. It was in the year 1818 that she underwent the lengthening process near the "Baths" Hotel, of Helensburgh, which was managed by Mrs. Bell. One of Bell's assistants (Bell in his day having been architect, millwright, shipwright, and hotel proprietor!) in the work of launching the lengthened vessel was Robert Taylor, who died at Helensburgh eight years ago, his assistance consisting of jumping on the deck of the vessel as—like the *Great Eastern* herself—the *Comet* was slow to move. The first engine of the pioneer steamboat was only of three H.P., but at the time of lengthening, a new engine of six H.P.—made, it is supposed, by Mr. John Robertson, of Glasgow—was fitted on board. As a subsidiary proof of new engines having been placed on board at this time it is pointed out that part of the original engine—the fly wheel—is still to be seen at a smith's shop in Helensburgh. It is a primitive-looking object viewed from the standpoint of present-day engineering practice, and for many years it was used by the smith as the wheel for his turning lathe. An anvil used by Henry Bell is another object of interest the smith delights in showing to his visitors.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—Rates of freightage have shown a tendency to improve lately, and this change for the better would doubtless have a stimulating influence on shipbuilding if no exceptional obstacle to an extension of business existed. The dispute in the engineering trade, however, has assumed such a phase as to practically interdict employers from entering into new contracts. We said last month that the struggle would be "long and bitter," and the events that have since taken place have more than verified the words. Everyone now recognises the impossibility of compromise in this dispute, and the feeling has become general that it cannot be ended till one of the disputants be beaten. The men's resources are not likely to be exhausted at this side of Christmas, and it may be taken for granted that with them there will be no inclination for hoisting the white flag until there are no longer any "sinews of war" to depend upon. Hence the unwillingness of both ship and engine-builders to accept new orders, and very little in this way is now being done, except under the protection of clearly-defined and stringent strike clauses. The effect of the dispute on the shipbuilding industry may be judged from the fact that on the 21st inst. 700 men of all sections were paid off at the Elswick yard of Messrs. Armstrong, Whitworth & Co., and that on the same date considerable numbers of men were discharged from other yards on the river. It is useless, or worse than useless, to launch vessels if engines cannot be got for them, and as the shipbuilders have, for the most part, gone about as far as they can go in the direction of forwarding the work of vessels on the stocks, it may be expected that there will now supervene a very widespread cessation of operations in the yards. This stoppage, or partial stoppage, will react on many subsidiary industries, so that the result will be more far-reaching than many people may be disposed to imagine. One of the results will be a diversion of the trade from England, and the men's leaders are not so obtuse but that they can see this, and admit it. A leading light amongst them has recently stated his belief in this contingency happening, but he appeared to contemplate it with equanimity, consoling himself for any possible unpleasantness by assuring his hearers that the masters would have to bear the responsibility of the disaster. If the work is driven away, it will be poor consolation to the men to pour undeserved blame upon the masters. We know that the masters do not want to drive work away, and neither do the men; but if this result should be brought about by the present strike in the engineering trade, who, we ask, should be to blame excepting those who first stepped into the arena? Contemporary history will bear witness that during the present year the engineers raised question after question, and received concession after concession, till they finally determined to plunge the country into an industrial war of unprecedented fierceness, by making a demand which can neither be defended or excused. The originator of a quarrel must always be responsible for the results, and, as the engineers were the originators in this case, it is they, of course, who must rightly bear the blame for every injury that is done to the trade by their action. The great majority of them will close their ears to everything excepting what is said to them by their leaders; but there must be among them some who can see that leaders who delight in pouring abuse upon their employers, and who forget themselves so far as to threaten, are not the safest or the wisest guides. There may not be many engineers who at this moment will come under the latter description, but time will increase their number, and by-and-bye it is to be hoped they will become numerous and bold enough to exercise an influence on the policy of the Union.

This is a consummation most devoutly to be wished; for if the wiser heads among the engineers are once convinced of the folly of the course they have entered on, they may demand an abandonment of that course, even before the resources of the society are exhausted, and may possibly bring about the termination of the struggle at an earlier date than is now generally anticipated.

The announcement has been made that the body of shipyard workers, known as drillers, and who for some years past have maintained a sectional trade union of their own, are about to be affiliated to the larger Society of Boilermakers and Iron-shipbuilders. The arrangement will make an addition of some three or four thousand members to the latter union, besides increasing the funds to the extent of £10,000. It will be remembered that many "demarcation" disputes have taken place between these bodies, one of which—in the early part of the present year—threatened most serious consequences. The amalgamation will, it is supposed, prevent the recurrence of such disputes, and this, of course, will prove a distinct advantage to all concerned. The Wear drillers, however, have still to be reckoned with, as, not being connected with the "National Society of Drillers," they are not included in the proposed amalgamation. They have a local society of their own which, since its inception some twenty years ago, has been kept completely independent of other unions, and it is not at all likely that the members will sacrifice their independence now. Their isolation, however, may bring them into trouble in the future; for the boilermakers are sufficiently aggressive to claim all drilling work for themselves as soon as the amalgamation with the general body of drillers is completed. In recommending this amalgamation to their members, the boilermakers' executive say, "We want to find an outlet for many of our young men who have been brought up to the rivet heating, and who have not the opportunity of becoming apprentices at the other branches of our trade. These young men could be allowed to become drillers, which would be a great benefit to them and us." The words we have quoted have, we think, a sinister meaning as regards the older and less capable men among the drillers; for they may be construed as indicating that the latter will be displaced, as opportunity arises, to make way for the "young men" referred to. In the interest of the drillers, therefore, it seems desirable that a clause should be inserted in the articles of amalgamation, which would have the effect of preventing the application of such an objectionable method of introducing new blood.

The berths of the Elswick yard are fully occupied with war vessels in course of construction, two or three of which are in advanced stages. The work of building the engines being, however, indefinitely delayed, it was deemed advisable not to push on the construction of vessels too rapidly, and hence the resolve to dispense with the services of a large proportion of the workmen employed.

At Messrs. Armstrong, Whitworth & Co.'s Low Walker yard

there are two exceptionally large cruisers in hand, in addition to a considerable amount of mercantile work; but here also, and for the same reason as at Elswick, a substantial reduction in the number of hands employed has been decided upon.

Messrs. Hawthorn, Leslie & Co. are preparing berths for the laying down of two vessels of the largest class, and of very superior equipment. It is understood that they are intended for an important new line, and were ordered some weeks ago—before the engineering dispute had been entered upon. The firm have other work in hand and in preparation, and it is stated that quite recently they declined to quote for the building of one or two large vessels, when invited to do so. This seems to indicate that the firm have as much work upon their books as they can safely count upon dealing with in time for the requirements of customers.

Messrs. R. Stephenson & Co. are making rapid progress with the building of the large pontoon ordered early in the year for location at a port in the Philippine Islands, and there is every reason to expect that they will complete the contract well within the stipulated time. The other large pontoon which is being constructed by Messrs. C. S. Swan & Hunter will be finished by the middle of September, and is expected to be ready for shipment (in sections) early in October. It is understood that the firm have orders for other pontoons, the construction of which will be proceeded with in the course of a few weeks. In the shipyards belonging to the firm, which immediately adjoin the pontoon building establishment, the briskness which has existed for many months past shows no perceptible falling off, though in view of the engine works stoppage, it is difficult to see how the condition of activity can be maintained much longer.

Messrs. Wigham Richardson and Messrs. Dobson both continue busy, the latter firm having the berths pretty fully occupied with small river steamers for Russia.

The yard of Messrs. Wood & Skinner is still kept brisk, there being four vessels—mostly of large size—on the stocks.

The Tyne Shipbuilding Co. have just handed over to the owners, Messrs. Wm. Milburn & Co., a fine vessel of the light draught cargo type, named the *Port Philip*, which is intended for general trade. The firm still remain busy, the work in hand being sufficient to keep them going for some months yet. The only possibility of a check to business lies in the prolongation of the engineers' dispute.

The Palmer Co. have some very large vessels in progress at their Jarrow yard, and are preparing to put down another. The frame furnaces are still kept going, and the finishing of war vessels in the water is being rapidly proceeded with.

In addition to the new work in hand at Messrs. Readhead's yard, the firm have a large amount of repair work, which they are getting through with remarkable facility, notwithstanding the stoppage in their engineering shops. Some orders have been booked lately by firms engaged in the building of fishing vessels, and the two or three yards at the mouth of the river, that are devoted to such work, are showing considerable briskness.

Engineering.—By the aid of non-unionists and apprentices the larger engineering works are still kept partially going, and in most cases it is found possible to make very fair progress with the execution of urgent contracts. At the Elswick works many of the non-unionist workmen who struck work five weeks ago in sympathy with the union men have since returned, and in some of the shops work goes on almost as briskly as before the strike. Two "demonstrations" have been held in Newcastle during the month, under the auspices of the Engineers' Society; but though on each occasion the platforms were occupied by prominent personages in the trade union world, it cannot be said that either was much of a success. The marching of the men through the streets attracted but little attention, and at the place of rendezvous, the crowds which came to listen to the speeches were neither large nor enthusiastic. This is a favourite method of fighting labour battles; but there is not much advantage to be gained unless the "demonstrating" has something tangible at the back of it to arouse popular sympathy. There is nothing of the kind in this case, as all that is the matter with the engineers is, that before the strike they were very well off indeed and were unhappily oblivious of the fact.

In the locomotive shops business is brisk, and small manufacturers of various engineering specialities are having large demands made upon their productive resources. Foundries, brass and copper works, and forges, are still generally kept pretty busy, and at the chain and anchor manufactories there is a large amount of work being done.

Messrs. Wailes, Dove & Co., the well-known manufacturers of patent bituminastic enamels for the coating of bunkers, exposed steel decks, holds, and tank tops under boilers, have at present contracts in hand at most of the shipbuilding centres, and are, in several cases, coating parts of the interior of Atlantic liners and other vessels of a superior class. At the firm's works trade is very active, being as yet practically unaffected by the stoppage in the engineering trade. The Meldrum furnace, for the sale of which Messrs. Crosier & Stephens, of No. 2, Collingwood Street, Newcastle, are the northern agents, is now attracting a good deal of attention in this district, its reputation as a fuel economiser having grown very rapidly of late. The marine type of the furnace has been adopted in a number of instances with very marked success, and we look forward to its more general adoption later, when its merits become more fully known. In these days of keen competition, economy of working and increase of speed mean a lot in the successful management of steam ships, and as the Meldrum furnace is guaranteed, under fair conditions, to bring about a combination of both advantages, it cannot fail to become popular.

The Zynkara Co., of 35 and 36, Side, are still experiencing a large demand for their speciality, which is now being exported in steadily increasing quantities to countries in both hemispheres. Zynkara, it may be stated, is a preparation for the prevention of corrosion in steam boilers, and has been proved, under all kinds of trying conditions, to be highly effective.

Messrs. Geo. Angus & Co., of the St. John's Leather Works, are still busy, especially in the manufacture of india-rubber goods of all kinds.

THE WEAR.

Shipbuilding.—It is understood that Messrs. Doxford have been commissioned to build one or two other vessels of the *Clan Macdonald* and *Clan Robertson* type by the owners of the "Clan" line of steamers, and that they also have received orders for turret ships from other sources. At Messrs. Short Bros. there is no falling off of briskness, and it is stated that they have just received an order from a local firm for another steamer of over 5,000 tons capacity. Messrs. Priestman and Messrs. R. Thompson & Sons are still having a fair amount of work; but at Messrs. Pickersgill's yard the signs of continued stagnation are but too apparent.

The work in progress at Sir James Laing's yards is of an exceptionally important character, and, notwithstanding the existence of strife, which means stoppage, in the engineering trade, the efforts to push forward contracts have not up to the present been in the least relaxed.

Messrs. J. L. Thompson & Sons have launched a couple of vessels during the month, making their output for the eight months six vessels, aggregating over 20,000 tons capacity. The firm have some repair work in hand, and are maintaining in employment almost the full complement of men. Messrs. Blumer have a good show of work on the stocks, and the same may be said of Messrs. Bartram & Sons and Messrs. Austin. The latter firm are, as usual, very busy with repair work, and at other repairing establishments there are vessels being overhauled.

The Sunderland Shipbuilding Co. are not at the moment overburdened with work, but this is a state of matters which, under present circumstances, will scarcely cause dissatisfaction. It is expected that when the engineering works are again in full swing the shipbuilding establishment last referred to will be showing no lack of work. A small vessel is nearly ready for launching at the Bridge Dock, and there is a considerable amount of repair work in hand.

Engineering.—There is little to report respecting the Sunderland Marine Engine Works, excepting that at the only establishment where the eight-hour-day method of working has been introduced overtime is being worked nightly. At the other works matters are very quiet, and a few new vessels are waiting turns to be fitted with machinery. Local ironworks are very well employed, and in the forges and foundries business is fairly satisfactory. At the electrical works of the Sunderland Forge and Engineering Co. several ship-lighting contracts have been secured, among them being the installations—consisting in each case of 200 lights—in two Japanese passenger steamers built on the Wear. It is understood that other [illegible] than ordinarily important character is being neg

in this instance, at all events, the outlook for the autumn and winter is satisfactory. Lynn's steam winch, and steam steering gear manufactory, in the immediate vicinity, is still kept going briskly, and other works in the same line are doing well.

The Hartlepools.—Although the shipbuilding firms at this centre have a satisfactory amount of work in preparation and in progress, they have deemed it essential to curtail output, in view of the engineering stoppage, which will have the effect of causing vessels to be detained some time after launching before they can get the requisite equipment of machinery. This is a necessary though regrettable alternative, and it will have the effect of condemning a good many operatives and labourers to a period of enforced idleness. In the engineering shops there is little doing, but the local steel works are busy, and at the docks there is a good demand for labour, owing to the large arrivals of timber laden ships.

Stockton.—It is reported that Messrs. Craig, Taylor & Co., of Thornaby-on-Tees, have been commissioned to build a steamer of exceptionally large carrying capacity for a well-known firm of shipowners. The other two shipbuilding firms at Stockton are well supplied with work. In the engineering works here, as at other centres, business is exceedingly quiet; but iron and steel works are still quite busy.

Middlesbro'.—Sir Raylton Dixon, who has, we are glad to say, entirely recovered from his serious illness, is credited by report with another order for a vessel of considerable size, to be employed in the South American trade. Engineering works at this centre, as elsewhere, are inactive; but at the steel making establishments, as also at the foundries and bridge building works, business is still quite brisk.

THE MERSEY.

(From our own Correspondent.)

THE lock-out and strike in the engineering trades continues to extend. In the Manchester district five more firms have joined in the lock-out, whilst in the Oldham district, which is the centre of the machine-making industry, the employers have at length thrown in their lot with the federated employers, and have not only locked out their men, but have formed a local branch of the Employers' Federation of Engineering Associations. In the Bolton district also there has been a substantial addition to the list of firms who have posted notices. All this means, of course, an increased strain upon the funds of the trade union societies, and the employers are more confident than ever that the struggle will end in their favour. The chief matter of interest in connection with the extension of the lock-out is the inclusion in the movement of the Scotch locomotive firms. In this district all the leading locomotive building establishments, with one exception, have joined in the movement, and the firm in question have only been holding back until competing Scotch builders co-operate in the lock-out. The Scotch firms have had the matter under consideration, and Messrs. Sharp, Stewart and Co., of Glasgow, have already posted notices, and it is expected that the other establishments will take the same course.

In the Manchester district the Amalgamated Society of Engineers is granting support to about 3,000 men, including members, non-society men and apprentices, and the United Machine Workers Association has about 500 members on the books, but no figures can be obtained as to the extent to which the Steam Engine Makers are affected. The Amalgamated Society of Engineers is raising an emergency levy of 1s., a contingent levy of 1s. per week, and a special local levy of 6d. per week, in addition to contributions, for the support of the men on strike. The levy raised by the Machine Workers' Association is 1s. 3d. per week on members, and 6d. per week on apprentices.

With regard to the general effect of the strike upon the trade union societies, the usual monthly report of the Amalgamated Society of Engineers showed about 20 per cent. of the members on the unemployed list, and of these only an insignificant proportion were thrown on the books through actual slackness of work, probably only about 1½ per cent. receiving benefit from this cause. The United Machine Workers' Association had over 40 per cent. on support. In the Manchester district the engineers' society had 33 per cent., and the machine workers' organization nearly 50 per cent. on donation. Reports as to trade continued good, but of course the strike had a depressing effect generally.

So far as this district is concerned, none of the firms who have joined in the lock-out have actually closed their establishments. They are generally kept going, as far as possible, with foremen, apprentices, and non-society workmen. Only one or two of the firms have made any great efforts to obtain outside workmen to replace those on strike, and the tactics of the trade unions have rendered this such an unsatisfactory proceeding that establishments as a rule are simply preferring to finish what work they have in hand, and ultimately if necessary shut down their works altogether until the dispute is satisfactorily settled. Of course, engineering establishments which have taken no part in the movement are kept fully going. There is plenty of new work stirring which would keep all establishments well employed, but in consequence of the strike orders which would otherwise be given out in this district are being placed elsewhere. This is, of course, one of the most serious aspects of the position, and if the strike is protracted over a much longer period, it is probable that, when a settlement is arrived at, many of the works will not have anything like sufficient orders in hand to keep them fully engaged.

Messrs. Laird Bros. state that owing to the lock-out in the engineering trade, in which, as we stated in our last issue, they have co-operated with the federated employers, there is nothing special to report with regard to operations in their shipbuilding yard.

Messrs. Fawcett, Preston & Co., Liverpool, have in hand a good deal of work for marine engines and boilers. They are making the engines and boilers for two twin-screw steamers for Messrs. Harland & Wolff, of Belfast, and have orders in hand for new boilers for three of the Mediterranean and New York Steamship Co.'s vessels. One of the steamers, the *Peconic*, has just been completed and sent to sea; another, the *Pawnee*, is now in progress; and the third, the *Picqua*, is expected to receive her boilers in a few weeks. It may be mentioned that the firm have also during the year received large orders for sugar machinery, and jute presses for India.

Messrs. Lancaster & Tonge, Limited, of Pendleton, Manchester, have recently carried out a considerable extension of their works. This includes the addition of a two-story wing, which has been arranged with galleries on each side, on the principle now so common in engineering works. Two dozen lathes and all the requisite milling and other machines have been laid down for adequately dealing with the firm's metallic packing trade, a branch of their business which is showing rapid expansion. The firm have also put down a special steam-testing plant, which is capable of testing the "Lancaster" steam traps, &c., up to 250 lbs. per square inch. We may add that the firm make a point of testing every trap sent out under the same conditions as those it will have to work at.

A new works has been opened by Messrs. W. F. Mason, Limited, at Knutsford Vale, near Manchester. Amongst other reasons which have necessitated the erection of a new works has been the steadily increasing demand for the firm's special gas producers and refuse gasifiers. It may be added that the gasifiers made by the firm will destroy refuse on somewhat similar lines to the gas producers, and will turn it practically into gas for works purposes, steam raising, etc. The firm have in hand several schemes in connection with the adaptation of the gasifiers for electric light undertakings.

The steady increase of traffic in one or two important branches of trade which are quite new to Manchester, and the introduction of which is one of the outcomes of the improved means of transit provided by the Ship Canal, has brought about important developments in connection with the provision of the necessary facilities for adequately dealing with the enlarged volume of trade. Four depôts for the storage of oil are being built, which together will cover upwards of 20 acres of ground, and the Manchester Corporation has recently completed, adjoining their cattle lairages, tanks with a capacity of 4,000 tons. A new grain elevator is being built by the Manchester Warehousing Co. This will be completed early next year, and will provide, in addition to present storage arrangements, accommodation for 40,000 tons.

In the iron trade the tone has been surprisingly firm in face of the dispute in the engineering industries. Of course, if the strike is prolonged over any considerable period, the iron market must necessarily be affected by the curtailment of requirements for consumption, and in many cases the stoppage of engineering works has already caused a suspension of deliveries of pig-iron on account of contracts, but it can scarcely be said that the full effects of the lock-out and strike have yet been felt, and there

has been no sufficient falling off in buying to appreciably influence prices, which maintain a firm tone generally, with a hardening tendency in some brands of pig-iron. In foundry qualities local makers are holding to their quoted rate of 48s. 6d. less 2½ delivered here, whilst in Lincolnshire, although basis quotations are unaltered, some makers are asking advances of 6d. upon minimum official rates, the average prices being 44s. 6d. up to 45s. net cash, with Derbyshire firm at 46s. 6d. to 47s. delivered Manchester. Forge qualities maintain a steady tone, Lancashire being quoted 46s. 6d. less 2½, and Lincolnshire 42s. 6d. net cash, delivered here. Outside brands have hardened up about 6d. per ton, ordinary G.M.B. Middlesbrough now averaging 48s. 10d., and named brands 49s. 7d. to 49s. 10d., net cash, delivered by rail Manchester, with Scotch iron 49s. net prompt cash, delivered at the Manchester Docks. For American pig-iron at the docks 47s. net is quoted, but considerable cargoes are expected shortly, and for iron to arrive orders could be placed at 46s. per ton.

Only a slow business comes forward in the finished iron trade, and local makers would be badly off but for a fair amount of demand for shipment. Lancashire bars, however, are still quoted £5 15s., and North Staffordshire qualities £5 17s. 6d. to £6 2s. 6d. Sheets average £6 15s. to £7, and hoops £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, and 2s. 6d. less for shipment.

The steel trade is beginning to feel the effects of the engineering trade dispute and a weak tone prevails generally. Hematites have eased down to about £2 16s. 6d. less 2½, with makers, who are poorly off for orders, prepared to entertain offers at under the above basis. Local-made steel billets are also lower, and are not quoted more than £4 6s. 3d. net cash. Steel bars have dropped in price about 2s. 6d. per ton, and are now obtainable at £6 to £6 2s. 6d. Common steel plates can be bought at £5 15s., and boiler plates at £6 2s. 6d., delivered in this district.

In the metal market business is quiet, the demand for engineers' requirements being of course for the most part suspended owing to the strike. During the month there has been a slight giving way in list quotations upon some descriptions of manufactured goods, but these prices are likely to return to the old basis. Quotations delivered Manchester district are as under:—Solid drawn brass boiler tubes, 7¼d.; condenser tubes, 8¾d., copper tubes, 8¾d.; brazed copper gas and steam tubes, 8½d.; brazed brass tubes, 7¾d.; rolled brass, 5¾d.; brass wire, 6d. to 6½d.; copper wire 7d. per lb.

The timber trade is dull, and with stocks accumulating, values have been difficult to maintain, a considerable decline having taken place in some directions. Teak comes forward too freely, and the demand is slow, with no alteration in prices. Only one cargo of greenheart has arrived, and there has been a fair consumption, but supplies are ample for requirements.

The position in the coal trade is much as last reported. The demand for all descriptions of round coal is slow, and, even with the pits working not more than four days per week, stocks are accumulating. House coals are meeting with only the most limited sale, and steam and forge coals are not moving away so freely, owing to the stoppage of engineering works in the district. Prices are, however, without quotable change, any concession on late rates being only on special sales to clear away surplus quantities. At the pit mouth best Wigan Arley averages 9s. 6d. to 10s.; Pemberton 4-ft. and seconds Arley, 8s. to 8s. 6d.; and common house coal, 6s. 6d. to 7s.; with steam and forge coal, 5s. 9d. to 6s. 3d. per ton. Engine fuel is not in such active request as recently, but, with supplies limited, prices are maintained at late rates, the better qualities averaging 4s 6d. to 4s. 9d; medium sorts, 3s. 9d. to 4s. 3d.; and common slack, 3s. 3d. to 3s. 6d. per ton at the pit mouth.

A fair business comes forward in the shipping trade, and prices are steady at recent quotations, ordinary steam coal fetching about 7s. 6d. to 7s. 9d. delivered at the ports on the Mersey.

The Chicago Shipbuilding Co. has taken an order for a steel tow barge, the largest on the lakes. She will be nearly a duplicate of the *Amazon*, which established the 6,000 ton record for Lake Superior. The addition will be 2 ft. to the beam.

Injeniero Hyatt.—The first-class torpedo boat *Injeniero Hyatt*, built for the Chilian Government by Messrs. Yarrow, which left Plymouth on the 28th April, arrived safely at Talcahuano, Chilli, on the 28th June, all well

BELFAST TRADE NOTES.

(From our own Correspondent.)

THE continued struggle between the A.S.E. and the Employers' Federation has seriously dislocated all branches of industry connected with shipbuilding and engineering. Fortunately, or unfortunately, Messrs. Harland & Wolff still hold aloof from the Masters Association, and thus a large number of engineers are still in employment here. Still, notwithstanding their conciliatory attitude towards the engineers, a serious stoppage of work in their yard was only averted at the last moment by the return to work of the plumbers employed by them, numbering close on one hundred men. These men, who have been out now for several weeks, struck for an advance of wages and at the same time insisted on the apprentice rule being revised. They have agreed to a proposal under which the Glasgow rule for apprentices will be adopted in the shops, and accordingly resumed work. The difficulty was got over just in time, as the firm had already posted notices intimating to the rest of the employés, that owing to the absence of the plumbers, a large reduction in the number of other tradesmen would require to take place, and in fact had suspended a large number of joiners, etc.

Meanwhile the engineers' dispute drags along with no apparent sign of a settlement, and as it is apparent by now, that the masters have got their backs to the wall, and are not flinching from the position taken up, the struggle will probably last a long time. At present, the firms affected are reducing gradually the other men employed, as the work gets finished in their department, and the outlook for the coming winter is far from a pleasant one.

The only new vessel launched during the month is the twin-screw steamer *Sado Maru*, being the second of the two vessels Messrs. Workman, Clark & Co., Limited, have constructed for the Nippon Tusan Kaisha, of Japan. This vessel is of similar dimensions to the *Kamakura Maru*, recently fully described in these columns, but will be rigged with two pole masts instead of four. The arrangement of the passenger accommodation has been slightly altered, while everything that experience could suggest has been carried out. The engines are triple-expansion of the latest type, supplied with steam from four natural draught boilers. The usual Japanese custom of liberating a flock of white doves at the launch was duly carried out.

The *Sado Maru* along with the *Royston Grange* and *Cypria*, now lies awaiting engines and boilers, which work of course cannot be proceeded with until the strike is settled.

During the month two trial trips have taken place here. The first of these being that of the twin-screw steamer *Rotterdam*, for the Holland-American Line. This large vessel is 470 ft. in length, with a breadth of 53 ft., and depth, 34 ft.; her gross tonnage being about 8,200 tons. The machinery, which consists of two sets of triple-expansion engines, embodies all the latest improvements. The ship is fitted throughout with electric light and also with refrigating chambers for the carriage of fruit, vegetables, etc., for the passengers. The first-class accommodation is very elaborate, the main saloon being arranged in teak, with handsomely-decorated poker-work satinwood panels, relieved with white and gold, surmounted by a handsome dome, with richly decorated glass. The library, which is immediately above the main saloon, is carried out in mahogany, with satinwood panels richly inlaid, and painted ceiling. The ladies cabin, which leads off the main companion, is principally decorated in satinwood, relieved with small poker-work panels, and especially designed tiles representing different views in Holland. In the main entrance hangs a very handsome painting of the young Queen of the Netherlands. The smoking-room, which opens off the promenade deck, is of a very handsome design, the work being carried out principally in oak, with tiled panels with different views carried out in sepia. The upholstery work in these four saloons has all been done in the very choicest materials, and specially designed for the ship in colours to suit the different decorations. The ship, after successful trial, left for Rotterdam with the managing director, Mr. Wierdsma, and a large party of friends, Captain Bonjer, the commodore of the line, having command of the vessel.

The other vessel leaving this month is the s.s. *Glenarm Head*, built by Messrs. Workman, Clark & Co., Limited, for the Ulster Steamship Co., Belfast. Her dimensions are:—Length, 360 ft.; 45½ ft. beam, by 30½ ft. deep, with a carrying capacity of 6,200 tons deadweight. The vessel is schooner rigged, with

two steel masts. The engines are triple-expansion with cylinders 25 in., 42 in., 68 in. with 48-in. stroke, and steam is supplied from two single-ended boilers fitted with forced draught. After a most successful trial trip the vessel left Belfast Lough for Ardrossan and from thence sailed to Montreal.

NORTH-WEST OF ENGLAND.

(*From our own Correspondent.*)

Barrow.—Further progress has been made in the direction of increased activity in the shipbuilding trade of Barrow during the past month. The work incidental to the building of H.M.S. *Vengeance* is proceeding satisfactorily and already several sections of the keel plates have been laid, and material is coming in daily for the work requiring earliest attention. During the month Messrs. Vickers, Sons & Co. have booked an order from the Telegraph Construction and Maintenance Co., Limited, for a steamer of 6,300 tons gross register and about 12,000 tons displacement, which is intended for the carrying and laying of submarine telegraph cables. This steamer will be of the following dimensions:—Length, 440 ft.; breadth, moulded, 54 ft.; depth, moulded, 36 ft. She will have a sea speed of 11½ knots, and will be built to Lloyd's special survey 100 A1 class. The building of this steamer is to be proceeded with at once, and arrangements are already in progress for putting down the keel blocks. No other orders have been booked at Barrow during the month, but prospects are good, and it is known that other work in the shape of warships, cargo steamers, and high-speed channel steamships is in progress of negotiation. There is reason to believe that the first-class cruiser *Amphitrite* will be launched this year at Barrow if the engineers' dispute does not lead to delays, which, if a settlement is not soon arrived at, are obvious. The work incidental to the construction of the engines of this cruiser, as in fact, all other engineering work in hand, is being impeded by the dispute, as only foremen and apprentices are at present employed. They have been employed since the strike or lock-out commenced in completing the engineering work of the 1,000 tons sludge boat for Manchester, now ready for delivery, and in the trial trips of two of the torpedo-boat destroyers now ready for final Admiralty speed tests, for which purpose they are about to proceed forthwith to the Clyde. The new Fleetwood and Belfast steamer, the *Duke of Cornwall*, is getting forward in plating and may be expected to be launched this year. On the engineering side of the yard of Vickers' works, at Barrow, there is not much that is new to report. The work of fixing up the machinery and boilers in H.M.S. *Niobe* is proceeding slowly, and the boiler-makers find themselves blocked in consequence of the fact that the engineers cannot keep up with them. Messrs. Vickers, Son & Co. have decided to put down a special plant for the treatment of wood whereby it becomes uninflammable. It is proposed to use this sort of wood in all cases of warship construction, as the experience of the ships engaged in the Chinese and Japanese war proves that ordinary wood cannot be used, as it becomes speedily charred, and consequently of no use in full action. For this purpose Messrs. Vicker, Son & Co. are taking a lease of new land adjoining their present works. There is here any amount of room for great developments in connection with the shipbuilding trade, and it is freely whispered that many departments will be added to the existing works as the scheme the new owners have in contemplation becomes more and more fully realised. The works already cover about 60 acres, and there are about 40 more acres available for developments and extensions when thought desirable all alongside Wakely Channel, which makes such an excellent water area for launching purposes.

Shipbuilding Material.—There is a good demand for shipbuilding material both on local and on general account, and the plate mills are especially busily employed. It has been decided by the directors of the Barrow Steel Co., the only makers of steel plates for shipbuilding purposes in the district, to close their mills down at the end of October, owing to their inability to keep them in operation at present prices. £5 a ton is about the current value of ordinary heavy steel plates, and if local makers cannot keep their works going with these prices, it cannot considered a good outlook for the future, when prices will probably come down to £4 10s. a ton on the basis of a quieter market. It is believed in some quarters that the object of the directors is to secure a new wages basis with their men. There may be something in this, but it is sincerely to be hoped it has not been determined to close down the mills permanently, as doubtless they are a source of considerable advantage to the local shipbuilding trade, because builders can secure cheaper deliveries when a local firm is competing for the trade. There is the further fact that local producers of plates have a good market by reason of especially cheap freights to Belfast, Glasgow and Liverpool, where large shipbuilding operations are being carried on. It is freely stated that if the Barrow Steel Co. ceases to produce ship plates, other firms in the district will commence to do so. Heavy steel castings are in brisk demand, and the foundries are all busily employed.

West Cumberland.—The shipbuilding trade in West Cumberland is fairly well employed. No new orders have recently been received, but prospects are good, and it is probable that in the course of a short time the keels will be laid down for commercial steamers of small tonnage, similar to those which are the general character of the output of the yards in the district.

The Hematite Trade.—There is a rather easier demand for hematite pig-iron, consequent on the engineering dispute and the smaller supplies of metal required in trade generally. Makers quote 48s. 6d. to 50s. 6d. for parcels of mixed Bessemer. Nos. net f.o.b., and warrant iron is at 47s. 2d. net cash sellers, 47s. 1½d. buyers. Stocks have gone down further during the month, and now represent in warrant stores slightly more than 200,000 tons.

Shipping.—The shipping trade is fairly well employed. Exports of metal are well maintained. There have been something like 70,000 tons of pig-iron shipped this year so far in excess of the tonnage shipped during the corresponding period of last year, and the decrease in steel shipments during the same period is about 40,000 tons.

Miscellaneous.

The Torpedo Destroyer "Bat."—The torpedo destroyer *Bat*, built and engined by Palmer's Shipbuilding Co., at Jarrow, has completed her trials. On her official 30-knot coal consumption trial the mean speed was 30·165 knots, and the mean of three hours' continuous steaming was 30·229 knots. The vessel carried the contract load of 35 tons, and, the coal consumption being within the limit allowed, no extra weight had to be carried on the final official trial. On the latter the mean of the six runs on the mile was 30·369 knots, and the mean of the three hours' continuous steaming was 30·129 knots. On one pair of runs with and against the tide the mean was 30·9 knots. The vessel is reported to have made the speed easily, steam blowing off a great part of the time.

The Baltic Canal Traffic.—According to the returns published of the Baltic Canal traffic during the first two years that the canal has been opened, the Government estimates are far from being realised. In the first year 16,834 vessels of 1,505,983 tons register passed through the canal, and in the second year 22,081 vessels of 2,036,861 tons register. The official statisticians expected a yearly traffic of 18,000 ships of 5,500,000 tons, and receipts amounting to over 4,000,000 marks. It will be seen, therefore, that while the anticipated number of vessels was almost reached in the first, and was actually passed in the second year, the tonnage fell considerably behind the estimates. Still more so the receipts, which for the first year amounted to only 897,451 marks, and last year to 1,086,432 marks. The cause for the non-realisation of the anticipated traffic returns is said to be that, contrary to expectation, sailing vessels have taken to the canal, while the steamers which use it are relatively few in number. Steamer traffic is the more profitable, as will be seen from the statistics in 1895-6, when, in spite of their being considerably less numerous, the dues on steamers amounted to 680,825 marks, and those on sailing vessels to 216,624 marks, while in 1896-7 the corresponding amounts were 816,645 marks and 269,787 marks. An explanation of the comparative insignificance of the steamer traffic has not been given. Not long ago it was reported that the canal administration had decided to widen and deepen the waterway, and although this was officially denied, and the *dementi* was supplemented by a statement to the effect that such a step would be unnecessary, it may be supposed that the working of the canal does not give every satisfaction.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Gull and Jay.—On July 15th Messrs. Edwards Bros. launched at North Shields, for Messrs. Kelsall Bros. & Co., the steel screw trawlers *Gull* and *Jay*. They are each about 144 tons gross register.

Celestial Empire.—On July 16th Messrs. Cook, Welton & Gemmell launched at Hull, for the Cargill Steam Trawling Co., Limited, the iron steam trawler *Celestial Empire*, a vessel of 174 tons gross register.

Joseph Thompson.—On July 17th Messrs. Vickers, Son & Co. launched at Barrow, for the Manchester Corporation, the twin-screw steamer *Joseph Thompson*. Her dimensions are:—234 ft. by 38 ft. by 14½ ft., and she is about 1,000 tons gross register. She is to be employed for the removal of Manchester sewage sludge, and will be classed 100 A1 at Lloyd's.

Goldfinder.—On July 17th Messrs. Cochrane & Cooper launched at Beverley, for Mr. E. M. W. North, of Grimsby, the iron steam trawler. *Goldfinder*, a vessel of 162 tons gross register.

Baltic.—On July 19th there was launched by Messrs. R. Williamson & Son, at Workington, a large steel barge, of the following dimensions:—Length, 130 ft.; breadth, 24 ft. 6 in.; depth, moulded, 11 ft. 10 in.; designed especially for carrying grain, and built to the order of the Liverpool Grain Storage and Transit Co., Limited. She was named the *Baltic*.

Chwerstone.—On Tuesday, July 27th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 342 ft.; breadth, extreme, 43 ft.; depth, moulded, 25 ft. 9 in.; gross tonnage, about 2,940 tons. This vessel, which has been built to the order of Messrs. Anning Bros., of Cardiff, will class 100 A1 on Lloyd's Register, and has been built under special survey. She is built to the three-deck rule with one deck laid, has a poop aft, for captain and passengers, long bridge with accommodation for officers and engineers in after end, and a topgallant forecastle for crew. A cellular double bottom throughout and after peak tank are fitted for water ballast, and her equipment includes five steam winches, large horizontal donkey boiler, steam windlass, stockless anchors, steam steering gear, etc., etc. Triple-expansion engines will be supplied by Messrs. Blair & Co. with boilers having a working pressure of 180 lbs. The vessel was christened *Chwerstone* by Mrs. Richard Anning, of Cardiff. Mr. F. D. Price, of Newcastle, has superintended the vessel during construction, and Captain Evans, of Cardiff, is overlooking the fitting out.

Duchess.—On July 29th Messrs. Eltringham & Co., South Shields, launched the steel screw steam trawler *Duchess*, a vessel of 150 tons gross, owned by Mr. R. Laing.

Queenswood.—On July 30th Messrs. Ropner & Son launched, at Stockton-on-Tees, a steel screw steamer of the following dimensions, viz.:—Length, between perpendiculars, 300 ft.; breadth, extreme, 45 ft.; depth, moulded, 22 ft. 2 inches. This steamer has been built to the order of Messrs. Constantine, Pickering & Co., Middlesbrough, and is fitted with the builders' patent "trunk," full poop, bridge, and topgallant forecastle. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co., Limited. The vessel was named *Queenswood* by Mrs. Pickering, of Saltburn-by-the-Sea.

Brantingham.—On July 31st Messrs. R. Thompson & Sons, Sunderland, launched the steel screw steamer *Brantingham*, a vessel of 2,630 tons gross.

Alpha.—On July 31st the steel screw steamer, *Alpha*, built by Messrs. William Gray & Co., Limited, for Mr. B. J. Van Hengel, of Amsterdam, through Messrs. E. A. Casper & Co., of West Hartlepool, was launched. The steamer is intended for the timber and general cargo trades, and takes Lloyd's highest class, and her dimensions are:—Length over all, 280 ft.; breadth, 39 ft.; depth, 18 ft. 2 in. She has a half poop, raised quarter-deck, and partial awning deck, with houses on deck for cabins. The hull is built with a deep framing and cellular double bottom, and the equipment will be of the most improved description, including steam windlass, steam steering gear, four steam winches, &c. She will have triple-expansion engines made at the Central Marine Engine Works of Messrs. Wm. Gray & Co., Limited, having cylinders, 19 in., 30½ in., and 51 in. diameter, with a piston stroke of 36 in., and two steel boilers to work at a pressure of 160 lbs. per square inch. The ceremony of naming the ship was gracefully performed by Miss Petersen, of West Hartlepool.

Puritan.—On Saturday afternoon, July 31st, Messrs. Craig, Taylor & Co. launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, the largest vessel they have as yet built, and which is of the following dimensions, viz., 368 ft. by 45 ft. by 30 ft. 9 in. depth-moulded. She is built of steel, to Lloyd's highest class, and is of the spar deck type, with poop, bridge, and topgallant forecastle. The vessel will carry a deadweight of about 6,600 tons, and will be equipped with six double-powered steam winches, steam windlass, steam steering gear, large multitubular donkey boiler, shifting boards, telescopic mast to Manchester Ship Canal requirements, water ballast in double bottom fore and aft, and in peaks, and all the latest improvements. The engines are being constructed by Messrs. Wm. Allan & Co., Limited, of the Scotia Engine Works, Sunderland, the cylinders being 25 in., 40 in., 67 in. by 45 in. stroke, two large boilers to work at 160 lbs. pressure. The steamer has been built to the order of Messrs. R. Stewart & Co., Liverpool, under the superintendence of Mr. F. J. Pilcher. As the vessel left the ways she was gracefully christened the *Puritan* by Mrs. M. B. Dodds, wife of the Town Clerk of Stockton. We understand that Messrs. Downey & Sons, of South Shields, have taken a "cinamatograph," or moving picture of the vessel, and probably the result of the work will be seen in places of entertainment shortly. The position of the vessel, moving off the ways, lends herself very favourably to an operation of this character. It may be mentioned that Messrs. Craig, Taylor & Co. are about to lay down a still larger vessel, and which will carry over 7,100 tons.

Victoria.—On Saturday, July 31st, the s.s. *Victoria* was launched from the shipbuilding yard of Messrs. Furness, Withy & Co., Limited, Middleton, West Hartlepool. This vessel has been built to the order of Messrs. The Wilsons & Furness-Leyland Line, Limited, and is intended for their Boston and New York passenger, cattle and cargo trade. Unusual interest was centred in this event, as this vessel is the largest ever built at the port. Her dimensions are as follows:—Length, over all, 490 ft.; beam, extreme, 52 ft. 3 in.; depth, moulded, 34 ft. 6 in.; with a deadweight carrying capacity of about 8,450 tons, and a measurement capacity of about 11,900 tons. She is built throughout of Siemens-Martin steel to Lloyd's 100 A1 class, although in many instances the scantlings are far beyond the society's requirements. She is built on the web frame principle with cellular double bottom for water ballast, with all the latest appliances for filling and discharging the tanks. The whole of the main framing of the vessel is of the strongest sectional material, the topsides being as strong as any other portion. This sectional framing is most efficiently supported by extra strong plating, all the sheer strake plates, stringer plates, etc., being increased in width and thickness, and to increase the strength of shell plating in way of any of the gangways, ports, etc., a large number of very long plates have been worked into the vessel, which, together with the extensive use of cold flanging, makes the ship exceptionally strong. The hull is divided into nine compartments by means of eight watertight bulkheads, fitted in accordance with Board of Trade requirements for ocean passenger steamers. She will have seven large cargo hatches and nine powerful steam winches by Messrs. J. H. Wilson & Co., of Liverpool, and double derricks for the quick manipulation of cargo. She has three complete steel decks, and in addition a shade deck above with a bridge 130 ft. long on top of it. Arrangements have been made for carrying about 700 head of cattle under the shade deck. Efficient arrangements have been made for the supply of fresh water and fodder to the cattle. A powerful patent direct steam windlass will be fitted forward for working the anchors, which are of the stockless type housing into hawse pipes; a most elaborate and efficient steering gear fitted aft, controlled by steel rods and chains from the midship deckhouse. Lifeboats and life-saving appliances will be fitted complete to Board of Trade requirements. The vessel will be rigged as a fore-and-aft four-masted schooner. The accommodation for the crew and cattle-men is placed under the shade deck forward. Accommodation for about 120 first-class passengers is to be fitted in the bridge and large deckhouse. This accommodation is of the most elaborate description, the materials and workmanship being of the very highest character. The main saloon, which is approached

by a grand double staircase, is handsomely finished in polished oak and walnut, a large amount of massive carved work having been tastefully worked into the panelling. The state-rooms are effectively finished in walnut and mahogany and the smoke-room is finished in polished oak richly carved. Everything will be done to make this accommodation up to date and luxurious in the extreme. The music-room, which is in the fore part of the deck-house above the main saloon, is tastefully enamelled in white and pink, and an upright grand piano by Brinsmead, having a special case to match the rest of the framing, is to be supplied. Bath-rooms, lavatories, electric bells, awnings, etc., will be fitted complete to ensure the comfort of the passengers at sea, and spacious promenades extend the whole length of the bridge and deck-house. The wants of the passengers will be attended to by an efficient staff of stewards, stewardesses, and cooks. An installation of electric light fitted throughout the vessel in the single wire system, will be fitted by Messrs. W. H. Allen, Sons & Co., Limited. The generating machinery consists of two single-cylinder engines, driving dynamos capable of maintaining continuously alight 120 16 C.P. lamps. The cylinders are 9 in. diameter by 7 in. length of stroke, and at 95 lbs. pressure they run at 275 revolutions per minute. Special care has been taken to prevent the compasses being affected by electric currents in their immediate neighbourhood. In the main saloon, music-room, smoke-room, etc., frosted bulbs will be fitted, the base being tastefully surrounded with a cluster of leaves in electro plate, the whole arrangement being most pleasing to the eye. A special feature of the installation is the use of armoured flexible cable for the portable lights in the engine-room and on deck, which will afford reliable protection against damage should the wires become twisted or left to chafe against the hatch coamings. The engines, which are being constructed by Messrs. Thomas Richardson & Sons, Limited, are the largest yet built in the Hartlepools, and have been designed to suit the requirements of the heavy Atlantic trade. The diameters of the cylinders are, 32 in., 54 in., and 90 in., by 66 in. stroke, on the three-crank triple-expansion principle, with a steam pressure of 190 lbs. per square inch. The high pressure cylinder is fitted with a piston valve, and the intermediate and low pressure with double ported slides, the cylinder supports consisting of massive cast-iron divided columns. A separate centrifugal pump is employed for circulating water through the condenser, and the air pump is of Edwards's design. In lieu of the ordinary feed pumps worked from the main engines, a complete set of Weir's engines and pumps will be fitted, and the various auxiliaries in the engine-room include large pulsometer for pumping ballast-tanks, Owen's feed donkey and fire-pump, Morison's combined evaporator and winch condenser. The propeller is of the variable pitch type, the blades being of manganese bronze, by the Manganese Bronze Co., London. Steam is supplied by two double and two single-ended boilers, the latter being in the centre and arranged back to back, either serving as an auxiliary in port. The boilers are fitted with Morison's suspension furnaces and Henderson's rocking firebars. On leaving the ways she was gracefully christened *Victoria* by Lady Furness. Prior to the launch a number of friends were entertained to luncheon at Tunstall Court by Sir Christopher and Lady Furness.

Afonwen.—On August 11th Messrs. John Readhead & Sons, South Shields, launched from their shipbuilding yard a new screw steamer, built to the order of Messrs. W. H. & C. T. Jones, of Cardiff. The vessel is 338 ft. in length, 47 ft. broad, and 26 ft. 4½ in. in depth, and is of the improved single-deck type, and classed 100 A1 at Lloyd's under special survey. She has a deadweight carrying capacity of about 5,500 tons on a light draught. The steamer will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, having cylinders 24 in., 40 in. and 64 in. by 42-in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. As the vessel left the ways she was named the *Afonwen* by Miss May Readhead, daughter of Mr. James Readhead.

Saint Helen.—On Thursday, August 12th, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer which they have built to the order of Messrs. Smith & Scaramanga, of London. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, over all, 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., will be fitted in the poop, the engineers' rooms in the bridge, and the crew's accommodation forward. The hull is built on the web frame principle, with a cellular double bottom, large hatchways, powerful steam winches, steam steering gear amidships, hand screw gear aft, patent donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The Central Marine Engine Works of Messrs. William Gray & Co., Limited, supply triple-expansion engines having cylinders, 23 in., 36 in. and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers to work at 160 lbs. pressure per square inch. The ceremony of christening the steamer *Saint Helen* was gracefully performed by Miss M. Warmington, of Burnt Ash Hill, Lee, S.E.

Wiltshire.—On August 12th Messrs. John Priestman & Co. launched at Southwick, Sunderland, a fine steel screw steamer, built to the order of Messrs. Thompson, Elliott & Co., Newcastle-on-Tyne. Her principal dimensions are:—Length, 301 ft.; breadth, 42 ft. 3 in.; and depth moulded, 21 ft. 7½ in. The vessel is of the single-deck type, with poop, bridge, and topgallant forecastle, and is constructed to Lloyd's highest class. She is built with a double bottom for water ballast in each hold, web frames right fore and aft, and five transverse watertight bulkheads. Four large hatchways are fitted on the upper deck, and the deck machinery consists of four powerful steam winches, patent direct-acting steam windlass, steam steering gear, and a powerful screw gear aft. A handsome saloon, together with spacious accommodation for captain and officers, will be fitted up under the poop. The engineers are berthed under the bridge aft at the sides of engine casing, and the crew under the topgallant forecastle. The engines will be supplied by Messrs. William Allan & Co., and are of the triple-expansion type, with cylinders 22 in., 38 in., and 59 in. diameter, and a stroke of 39 in. Two large boilers will supply steam at a pressure of 160 lbs. per square inch. The christening ceremony was performed by Mrs. Thompson, wife of Mr. J. W. Thompson, of the owners' firm, who named the vessel *Wiltshire*.

Citta di Palermo.—On August 12th there was launched by Messrs. Short Brothers, at Sunderland, a very fine spar deck steamer, built to Lloyd's highest class, to the order of Messrs. Peirce, Becker & Ilardi, of Messina, for their fruit trade to America. Her dimensions are:—320 ft. by 44 ft. by 26 ft. 8 in., with a cargo capacity of about 4,500 tons. She will be supplied with engines by Messrs. George Clark, Limited, of about 1,500 I.H.P., having two large boilers of 180 lbs. working pressure, fitted with Howden's forced draught. These engines are of strength in excess of Lloyd's rules, and fitted with feed-heater, and a good supply of spare gear. This steamer has two complete iron decks with lofty space between; full poop, topgallant forecastle, and bridge deck 100 ft. long and 8 ft. high, the intermediate spaces being filled in with a shade deck of pine. She has seven watertight iron bulkheads, and cellular bottom fore and aft for water-ballast; also five holds of about equal capacity, worked by large steam winches and double derricks. The vessel has been built to a high-class specification, and the cabins fitted up in very handsome style in solid oak, which, together with the engineers' and officers' accommodation, is fitted on the top of the bridge, leaving the underneath entirely free for cargo and cattle. During construction the hull and machinery have been under the superintendence of Mr. J. Baxter, of Newcastle, and Captain Queirolo, the owner's marine superintendent, who will take command on completion of the vessel. Amongst those present at the launch were the Misses Short, Mr. Joseph and Mr. Tom Short, Mr. Swainston, Mr. and Mrs. G. Swainston, jun., Captain and Mdme. Queirolo, Mr. John Baxter, and others, and as the vessel left the ways she was named the *Citta di Palermo* by Mrs. George Swainston, jun.

Craigneuk.—On Friday afternoon, August 13th, Messrs. The Blyth Shipbuilding Co., Limited, launched from their shipbuilding and repairing works at Blyth, for Messrs. Russell, Huskie & Co., of Leith, a steel screw-steamer, designed to carry a large cargo on a light draught of water. The principal dimensions of the vessel are:—Length, 337 ft.; breadth, 47 ft.; depth, 24 ft. 10 in.; with poop for cabins, bridge amidships, and topgallant forecastle for crew. The vessel will take Lloyd's highest class, and is built on the three-deck principle with single deck laid, and deep framing, thus giving a very large

area in the holds for stowing cargoes of the bulkiest description. The engines will be fitted by Messrs. Blair & Co., Limited, of Stockton-on-Tees, and are of the triple-expansion class, and fitted with all their latest improvements for the easy working of the machinery and economy in fuel. As the vessel left the ways the ceremony of naming her the *Craigneuk* was gracefully performed by Miss Nixon, daughter of the secretary of the company.

Min.—On August 13th Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, launched the s.s. *Min*, built to the order of the Mercantile Steamship Co., Limited, London, this being the ninth vessel built by Messrs. Thompson for this company. Her principal dimensions are:—Length, between perpendiculars, 325 ft.; breadth, extreme, 44 ft. 6 in.; depth, moulded, 22 ft. 6 in. The vessel is built to the partial awning deck rules, and is designed to have a carrying capacity of about 4,750 tons with Lloyd's summer freeboard. She has six watertight bulkheads, and an iron longitudinal bulkhead right fore and aft, to the height of the weather deck. She is rigged as a two-masted fore-and-aft schooner, and has a complete system of derricks for the handling of cargoes. The whole of the officers', engineers', spare berths, and saloon accommodation is fitted amidships, the saloon house being a continuation of the engine and boiler casing. Above this is placed a large chart and wheel house, and the pilot bridge overhead. A flying bridge is also fitted forward of the foremast. The engines and boilers will be fitted by Messrs. Thos. Richardson & Sons, Limited, of West Hartlepool, the size of the engines being 24 in., 38 in., and 64 in. by 42 in. stroke, with two large multitubular boilers working at 160 lbs. pressure. The vessel was gracefully christened by Miss Florence Buchanan, daughter of Capt. Buchanan, secretary of the company, and was launched by hydraulic power by Madame P. Rickmers, of Bremerhaven. There was a large company present, including Mr. Peter Rickmers, of Bremerhaven; Miss A. Rickmers, daughter of Mr. Andreas Rickmers, of Bremen; Miss von Grüter Rickmers, niece of Mr. Rickmers; Capt. and Miss Buchanan, of London. There was also a large number of local ladies and gentlemen, including the representatives of the builders' firm. After the launch, which was most successful, the company adjourned to the firm's luncheon room, where the usual toasts were duly honoured.

Iron Lighter.—On August 14th, Mr. Joseph Scarr, Grovehill, Beverley, launched an iron lighter of the following dimensions, viz.:—length, over all, 70 ft.; beam, moulded, 17 ft. 6 in.; depth, moulded, 8 ft. 6 in.; and a carrying capacity of 180 tons. It was built to the order of Messrs. Thos. Wilson, Sons & Co., Limited, Hull, and is the fourteenth vessel he has built for the above-named firm.

Yanda.—On August 14th there was launched at North Shields, by Messrs. Edwards Bros., a steel screw steamer, the first of two, for Mr. Wise, of West Hartlepool. The vessel is of the following dimensions:—Length, 140 ft.; breadth, 23 ft.; depth, 11 ft. The main engines consist of a set of triple-expansion, having cylinders 12 in., 18 in. and 30 in. diameter, by 21 in. stroke, and a large multitubular boiler, working at 160 lbs. pressure.

Sallust.—On Saturday, August 14th, Messrs. Sir Raylton Dixon & Co., Limited, Cleveland Dockyards, Middlesbrough, launched a large cattle and cargo steamer which has been built for the well-known firm of Messrs. Lampert & Holt, of Liverpool, and intended for their trade between Liverpool and the west coast of South America, Brazil and River Plate. Her dimensions are:—Length, 367 ft.; beam, 47 ft.; depth, moulded, 27 ft. 9 in., with a deadweight carrying capacity of about 5,600 tons. The vessel is built on the web-frame system to Lloyd's highest class, spar deck rule, with poop, bridge and forecastle. The spar and main decks are of iron and steel and the hull is divided into seven compartments by six watertight bulkheads. Water ballast is carried in cellular double bottom and both peaks, and the vessel is fitted with all the latest appliances for filling and discharging the tanks. A complete installation of electric lighting will be arranged throughout the vessel of the most perfect description. Handsome accommodation is provided for passengers and officers in houses on bridge and for cattle-men under the bridge. Her machinery, which is being constructed by the North-Eastern Marine Engineering Co., Limited, Wallsend, consists of a set of triple-expansion engines with cylinders 26 in., 43 in. and 71 in., by 48-in. stroke, having two boilers 16 ft. by 12 ft. 6 in. working at 180 lbs. pressure, Howden's forced draught, etc., etc. The hull and machinery have been built under the supervision of Mr. Russell, superintendent to the owners, and Mr. Morrin, their superintendent engineer, respectively. On leaving the ways she was gracefully named *Sallust* by Mrs. Russell.

Kirklee.—Lately Messrs. Bartram & Sons launched from their shipbuilding yard, South Dock, Sunderland, a large steel screw steamer, which they have built to the order of Messrs. J. R. Cuthbertson & Co., Glasgow. The vessel is of the spar deck type, with long poop, bridge, and forecastle, and is a handsome model, with medium fine lines. The following are the principal dimensions:—Length, 344 ft.; breadth, 45 ft.; depth, 28 ft. 9 in. There are no hold beams, and the holds are well adapted for machinery and general cargoes. The spar deck and tank top are of iron, and are of extra thickness to guard against corrosion. The hatchways are very large, and are each fitted with large derrick and powerful steam winches for the expeditious loading and discharging of cargo. The steam steering gear is placed in the engine-room, and controlled by shafting from the flying bridge, and has been supplied and fitted up by Messrs. Caldwell & Co, Limited. The engines will be fitted on board by Messrs. John Dickinson & Sons, Limited, the cylinders being 24½ in., 40 in., and 66 in. diameter, by 45 in. stroke. The boilers are of extra size and fitted with Howden's system of forced draught. The vessel has been built to take the highest class in Lloyd's registry, and during construction the hull has been surveyed by Mr. James M'Ewan, of Greenock, and the machinery by Mr. M'Kechnie, of Glasgow, on behalf of the owners. As the vessel moved into the water she was named the *Kirklee* by Mrs. Cuthbertson, wife of the managing owner.

LAUNCHES—Scotch.

Mingary.—On July 14th Messrs. J. Reid & Co. launched at Whiteinch, on the Clyde, the steel steam yacht *Mingary*, a vessel of 209 tons gross. She is owned by Mr. C. D. Rudd, and is to receive the highest class in Lloyd's Yacht Register.

Mountpark.—On July 28th Messrs. Robert Duncan & Co., Limited, launched at Port-Glasgow a steel screw-steamer for Messrs. J. and J. Denholm, Greenock. The vessel is 225 ft. by 34 ft. by 16 ft. moulded, and is specially fitted for carrying sugar cargoes of about 1,500 tons on a very light draught. The water ballast is placed in a double bottom in the after-hold, on the Mac-Intyre system, and in the fore-hold in a deep tank with large watertight hatches. The fore-and-after peaks are also arranged to carry water ballast for trimming purposes when required. The accommodation for captain and officers is placed in the bridge, while the engineers are accommodated below the quarter deck abaft the engine-room bulkhead, and the crew in the forecastle. The engines are of the triple-expansion type, and are being supplied by Messrs. Hall-Brown, Buttery & Co., of Govan. The cylinders are 17½ in., 29 in., and 47 in. by 33 in. stroke, and the boiler 15 ft. by 10 ft. 6 in., having a working pressure of 160 lbs. During construction the vessel and engines were superintended by Mr. Robert Miller, of the Park Line. She was named *Mountpark* by Miss Denholm.

Cape Otway.—On July 29th Messrs. Russell & Co. launched from Kingston Yard, Port-Glasgow, a steel screw-spar-decked steamer of 3,400 tons deadweight carrying capacity. The dimensions are:—Length, 326 ft.; breadth, 40 ft.; depth, 24 ft. 6 in. This steamer has been constructed to the order of the Australian Transport Co., to be engaged in the Australian coasting trade. Accommodation is provided for 60 saloon and 200 steerage passengers, and provision is also made for the conveyance of horses and cattle. The steamer was gracefully named *Cape Otway* by Mrs. R. D. Galbraith, London. Triple-expansion engines will be supplied by Messrs. Hutson & Son, Glasgow, the cylinders being 25 in., 40 in., and 64 in. by 45 in. stroke. The construction was superintended by Captain Pritchard, and the steamer will be commanded by Captain Sheddon.

Garvogue.—On August 3rd Messrs. Fleming & Ferguson, Limited, shipbuilders and engineers, Paisley, launched from their yard a steel screw hopper dredger, built to the order of Messrs. The Sligo Harbour Commissioners. The vessel during construction has been under the superintendence of Mr. H. H. West, C.E., of Liverpool. As she left the ways she was named the *Garvogue* by Miss Jenny A. Fleming, Elmhurst, Langbank.

Tamba Maru.—On August 3rd Messrs. Napier, Shanks, & Bell, Yoker, launched the *Tamba Maru*, being the last of three twin-screw steamers constructed by them for the Nippon Yusin Kaisha, Tokio, Japan. This vessel, like her sister ships, *Kawachi Maru* and *Senaki Maru*, is about 6,000 tons gross, of the three-deck type, with poop, bridge, and forecastle, and partial shade deck, constructed to Lloyd's 100 A1 class, and also to Board of Trade requirements for passengers. The *Tamba Maru* is adapted for carrying a large deadweight of cargo, is fitted with the most approved appliances for safety and economical handling of cargo, and has at the same time superior accommodation for a large number of first and second-class and steerage passengers. The vessel will also have a complete installation of electric light, including signal and Suez Canal lights. This work is being done by Messrs. Allen, Son, & Co., Bedford. Efficient ventilation will be secured by the use of the Grahtryx Ventilation Co.'s special machinery and ventilators. The engines (twin screw), supplied by Messrs. Dunsmuir & Jackson, are constructed and furnished in the best style. The vessel has been built under the supervision of Captain Perium and Mr. George Macfarlane.

Alexandra.—On August 3rd Messrs. Alex. Stephen & Sons launched a large four-masted steamer for the Wilsons & Furness-Leyland Line, Limited, of London, for their trade between London and New York and Boston. The vessel is inended for passenger and cattle trade, as well as being capable of carrying about 8,000 tons deadweight of cargo; and has been constructed under Lloyd's rules for the 100 A1 three-deck rule class, with many extras in excess of their requirements, and also conforms with the Board of Trade rules for passenger certificate. She has three complete steel decks besides the quarter deck, which is also of steel amidships, sheathed with yellow pine. There are nine watertight bulkheads, double-bottom fore and aft forming the ballast tanks, besides a deep tank holding 900 tons. The dimensions of the hull are:—Length, over all, 490 ft.; breadth, 52 ft. 3 in.; depth, moulded from upper deck, 34 ft. 6 in. Accommodation for 150 first-class passengers is provided in a large bridge house on top of shelter deck (the bridge extending the whole breadth of the ship); and a large deckhouse on top of this extending nearly the whole length of the bridge, but leaving a passage of about 7 ft. at sides, over which the promenade deck is carried forming a sheltered promenade. The dining saloon is at forward end of bridge and is handsome and cheerful, the structural work being of mellow coloured mahogany with panels of satin-wood effect. The ceiling and wall spaces have been specially modelled in Tynecastle canvas, in a phase of delicate Renaissance work in which the Greek feeling is traceable, and this gives piquancy to the ornamentation. The seats are in figured velvet of a fine rose red colour. Abaft the saloon the starboard side is occupied by passengers' state-rooms, the port side by cabins for officers and engineers; while other officials, &c., are located at after end with separate entrance. Leading up from this deck to deckhouse above is a grand staircase, forming companion way and passages, which are lined in wainscot work, with friezes and panelled spaces in modelled canvas gilt and coloured. The clever manner in which light wells or shafts have been worked in with the stairways has afforded opportunities for introducing interesting variations in the design, and the borrowed lights show to good effect. In this deckhouse is the music-room. It is of a very lightsome and graceful character. Some of the features of the Louis XV., or old English periods, are clearly traceable in the ceiling and walls, which are of delicately modelled Tynecastle canvas, and the woodwork is in very light mellow plane-tree. The figured velvet seat covers are in a shade of grey blue which is harmonious with the decorations, and there is a feeling of coolness and elegance. The piano is recessed in the fore wall; and at after end is a handsome bookcase, over which is a screen of tinted glass, admitting light from the shafts which supply the top light of the saloon. There are also a number of state-rooms on port and starboard sides. At the after end is the smoking-room. Here there is teak panelling with small carved panels, and the delicately-modelled canvas ceiling in the Adams style is painted in a light sage tint. A prominent artistic effect is obtained by the covering of a semi-circular curved wall which projects into the room around, which is a luxurious seat. This wall is covered with a handsome hand-painted leather design, of old Spanish character. The roof on this deckhouse is carried out to ship's side and supported by stanchions forming a large promenade deck, at fore end of which is a deckhouse containing captain's room, chart-room and wheelhouse, and a staircase leading to cabins below. The seamen, firemen and cattlemen are berthed forward on the upper deck. On the shelter deck—which is the working deck of the steamer—are fitted cargo-working appliances of the most efficient type. The combined hand and steam-steering gear is placed in a wheelhouse on shelter deck aft, and has been supplied by Hastie, of Greenock. Electric light, supplied by Mr. W. H. Allen, Sons & Co., is fitted throughout the entire vessel; and the whole of the living accommodation is heated by steam, and baths and wash-basins are supplied with both hot and cold water. On deck below is the passenger accommodation, and entirely separated from it in every way is the provision for carrying cattle. It is sufficient for about 640 head, and is of the most improved and modern type, fully satisfying both British and American conditions. The machinery consists of one set of triple-expansion engines, having cylinders 32 in., 54 in. and 90 in. diameter respectively, by 66 in. stroke, each cylinder being fitted with a liner and separate valve face. Balance pistons are fitted to the I.P. and L.P. slide valves. The crank shaft and tunnel shafting are of forged ingot steel. The condenser has a very large cooling surface, and is made in Messrs. Stephens' usual style, viz., of steel plate, circular in form, a method greatly superior to the ordinary cast condenser, as it is practically impossible to break it. A large centrifugal pump for circulating purposes is fitted of Drysdale & Co.'s make, having two separate engines, each being capable of driving the pump at full speed. A jet injection is also fitted to the condenser. The air pump and two bilge pumps are worked off the L.P. crosshead. There are no feed pumps on the main engines, two Weir's pumps being fitted of large capacity. A large auxiliary duplex pump with gun-metal water end, of Maudslay, Sons & Field's make, is also fitted; and is constructed so as to act as a testing pump for the boilers when required. A duplex pump of Clarke, Chapman & Co.'s make acts as a fire extinguishing pump, and also as a fresh-water pump for cattle purposes. A hand pump (which can be worked when desired by the main engines) is also fitted. A large pulsometer forms the ballast pump, which is capable of emptying the entire ballast tanks of the ship in a very short time. There is a 40-ton Quiggin's evaporator, which is also capable of acting as a condenser for the exhaust steam from the winches and auxiliary engines. A pulsometer is attached to the evaporator for circulating purposes. The feed water filters for arresting all grease and oil in the feed water is Quiggin's patent. The propeller has four blades of manganese bronze (Manganese Co.'s own make). The deck machinery consists of nine winches of Clarke, Chapman & Co.'s make, one with 10-in. cylinders by 16-in. stroke, one 8-in. cylinders by 12 in. stroke, and seven 7-in. cylinders by 12-in. stroke. The boilers are four in number, two double-ended and two single-ended, working at a pressure of 190 lbs. They are fitted with Henderson's patent rocking fire-bars, and have ample heating and grate surfaces to give 5,000 H.P. at sea. The main funnel is double, and very large ventilators have been fitted to the stokeholds. All labour-saving appliances possible have been fitted—such as steam reversing gear, steam turning gear, steam ash-hoists, &c., &c. In short the whole machinery has been designed and fitted so as to give the highest results both in efficiency and in economy in labour and fuel. In case of a breakdown a heavy list of spare gear, covering nearly all working parts of the machinery, has been supplied. Among those present at the launch were Mr. Walter Glynn, of Liverpool, one of the directors of the company; Mrs. Glynn, Mr. H. B. Roper, secretary of the company; Captain Trant, building superintendent; the Lord Provost, Glasgow; Mr. and Mrs. Maclay, and Mr. McIntyre, Mr., Mrs. and Misses Thomson, St. John's, N.B., &c. The vessel was gracefully named *Alexandra* by Mrs. Glynn.

Cambria.—On August 4th there was launched from the Leven Shipyard, Dumbarton, of Messrs. Wm. Denny & Brothers, a new vessel for the London & North-Western Railway Company's service between Holyhead and North Wall, Dublin. The principal dimensions are: Length over all, 337 ft. 6 in.; breadth, moulded, 39 ft.; depth to awning deck, 24 ft. 9 in. The vessel has been built of mild steel. The general appearance is extremely handsome, the two large funnels, the tapering masts, and the long range of casings and deck-houses giving her more the look of an ocean liner than of a cross-channel steamer. The passenger accommodation occupies almost the whole vessel, there being very little cargo

carried. The first-class dining saloon is a large apartment on the main deck, capable of dining 80 passengers at a time. The foremast comes down through this compartment, and the boxing round it has been utilised to form a bookcase and writing table, with comfortable chairs for use of passengers. Abundance of light is supplied by large side-lights with haircloth spring blinds, and by a large skylight overhead with stained glass. The steerage accommodation, which is situated at the after end of the ship on the main and lower decks, though plain compared with the richness of the first-class, is comfortable and commodious, and fitted with all modern conveniences, separate rooms being provided for women. The vessel is lighted throughout by electricity, the machinery being in duplicate, so that, in the event of anything going wrong with one engine, the other could maintain the light alone. Besides the internal illumination, the masthead, side and stern lights are electric, and are fitted with tell-tales to show that they are working properly. A very complete electric-bell installation is fitted throughout the first-class accommodation, and the ventilation of all passenger and crew spaces is effected by means of electrically-driven fans wherever the natural draught ventilation is not sufficient. The appliances for working and navigating the ship are in the complete and high-class style usual in the company's vessels. The steering gear is Brown's combined steam tiller and hand gear, controlled from the flying bridge by the maker's telemotor. The rudder is built to the form of the ship, and has a cast-steel frame and forged ingot steel stock. A powerful windlass is fitted on the awning deck forward for working the anchors, and a slow and fast speed capstan worked from it for warping the vessel. A similar steam capstan is also fitted aft for this purpose. A steam winch is fitted forward and one aft for working the mail and parcel post baskets, and the amount of cargo which is carried in an express steamer. The vessel is navigated from the flying bridge, where there is a great array of telegraphs for engine, steering, and docking signals, and speaking tubes to engine-room and forecastle. A similar bridge is fitted over the steering gear at the stern to facilitate the handling of the vessel in port. In order to secure safety from fire there is a very extensive fire service, connected to two powerful duplex pumping engines, and supplied with a large quantity of hose. The life-saving appliances in the shape of boats, of which there are eight, lifebuoys, lifebelts, &c., are on the same extensive scale, but owing to the efficient system of subdivision by watertight bulkheads the likelihood of these appliances being put to any use except as a drill for the crew is extremely remote. The propelling machinery consists of two sets of triple-expansion engines, supplied with steam at 160 lbs. per square inch by eight single-ended boilers. There are four cylinders to each set, having cast-steel pistons, the H.P. and I.P. cylinders having piston valves, and the two L.P. cylinders having double-ported slide valves, with relief rings on back, and Joy's balance pistons on top of spindles. The piston rods, connecting rods, and valve gear is controlled by Brown's combined steam and hydraulic reversing gear. The crank shaft is built of mild ingot steel and is hollow, as are also the crank pins. The sole plate and guide columns are of cast steel, which is also used generally throughout the engines in place of cast iron in order to obtain greater strength and lightness, The engines are balanced on the Schlick principle so as to avoid vibration. The circulating pumps are of the centrifugual type, and are arranged to pump out the machinery spaces and holds in case of serious leakage, thus forming a valuable auxiliary to the main pumping system. The feed pumps are also independent of the main engines, and are two in number, each being able to do the whole work if required. The feed water passes through a feed heater and filter, or may be sent direct to the boilers by means of an arrangement of by-pass valves and pipes as desired. The boilers are constructed of mild steel to Board of Trade requirements, and each is fitted with three corrugated steel furnaces, with independent combustion chambers. The boilers are grouped in two separate stoke-holds, and are arranged to work under forced draught, for which purpose four large fans are fitted. The system of duplication has been carried out wherever possible, so that the vessel may be considered perfectly safe, even in the very remote contingeney of a breakdown of half her machinery. The saloon and cabins for captain and officers will be fitted up in the poop, and the accommodation for engineers will be provided in iron houses on the bridge deck, the crew being berthed in the forecastle as usual. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of about 4,100 tons on Lloyd's summer freeboard on a light draught of water. The ceremony, which was in every way successful, was, performed in a graceful manner and in presence of a large and representative company by Mrs. Binney, wife of Captain W. H. Binney, marine superintendent of the owner company.

Jassy.—On August 10th Messrs. R. Napier & Sons, Limited, launched from their shipbuilding yard, Govan, the last of three steel screw steamers to carry 3,500 tons they have on hand for the Direction Generale of the Roumanian State Railways. These vessels have been specially designed to meet the requirments of the service of the Government State Railways, and are intended to develop the important trade between the Roumanian ports and Western Europe. The general dimensions are:—Length, 300 ft.; breadth, 39 ft. 6 in.; depth, 24 ft. 6 in. with a topgallant forecastle, long bridge and full poop, and are built of steel on the deep-frame principle, with cellular double bottom all fore and aft, to the highest class at Bureau Veritas under special survey. The most modern appliances have been supplied for the effieient working of the ship and the rapid handling of cargo, including a complete installation of electric lighting throughout the vessel, and comfortable accommodation for the captain, officers, and engineers has been provided on the bridge deck. The machinery consists of a set of triple-expansion engines with two steel boilers, and fitted with the most recent improvements for efficiency and economy. As the steamer commenced to move down the ways she was named the *Jassy* by Miss May, and after a successful launch was towed up the harbour to receive her machinery, which has been constructed at the builders' Lancefield Engine Works.

Bruce.—On August 12th Messrs. A. & J. Inglis launched from Pointhouse Shipyard a steel screw steamer of 1,200 tons for Mr. R. G. Reid, St. John's, Newfoundland. As the vessel left the ways she was named *Bruce* by Miss Reid, of Coupar-Angus.

Whimbrel.—On August 12th the Caledon Shipbuilding and Engineering Co., Limited, Dundee, launched a large steamer built to the order of the Cork Steamship Co., Limited. The vessel has been constructed to the highest class of the British Corporation, and is of the following dimensions:—Length, over all, 239 ft.; breadth, 32 ft.; depth in hold, 15 ft. 8 in. Her engines are of the triple-expansion type, having cylinders 19 in., 30 in. and 50 in. diameter respectively, with a piston stroke of 33 in. One large steel boiler supplies steam at a pressure of 160 lbs. to the square inch. The vessel was christened *Whimbrel*.

Moa.—On August 13th there was launched from the yard of Messrs. Murdoch & Murray, Port-Glasgow, a steel twin-screw steamer of the following dimensions:—Length, 145 ft. breadth, 31 ft.; depth, to awning deck, 13 ft. 3 in. The vessel is built for passenger and cargo service on the River Amazon and will have an extremely light draught when loaded. The arrangements of the vessel are somewhat similar to the other vessels built by the firm for this trade. On leaving the ways she was named the *Moa* and was towed to Glasgow where Messrs. Lees, Anderson & Co. will supply two sets of compound engines.

Hotspur.—On August 16th the powerful twin-screw tug steamer *Hotspur*, for the London & India Docks Joint Committee, was launched by Messrs. Wm. Simons & Co., Limited, Renfrew. Its dimensions are:—Length, over all, 114 ft.; breadth, 22 ft.; depth, 12 ft.; fitted with two sets of compound high and low pressure engines and two of Messrs. Babcock & Wilcox patent water-tube boilers of 800 I.H.P. for 200 lbs. working pressure. It has separate surface condenser, air and circulating pumps, automatic feed pumps, steam starting gear and latest improvements in vessels of this class. The hull and machinery have been constructed under the direction of H. F. Donaldson, Esq., M.I.C.E., engineer-in-chief, London and India Docks.

Almida.—On August 17th Messrs. A M'Millan & Son launched, at Dumbarton, the steamer *Almida*, a vessel of 1,600 tons gross and 2,700 tons deadweight. Her dimensions are:—Length, 260 ft.; breadth, 37 ft.; and depth, 20½ ft. She has been built to the highest class at Lloyd's, and is owned by Messrs. W. S. Miller & Co. Glasgow.

Batavier II.—On August 17th Messrs. Gourlay & Co. launched at Dundee a steel screw steamer named *Batavier II.*, the first of two which they are building for the Nederlandsche Stoomboot Maatschapptj, of Rotterdam. The vessel is intended for the company's cross-Channel trade, and has been con-

structed under special survey to the highest class in Bureau Veritas Registry, her principal dimensions being:—Length 244 ft.; breadth, 33 ft. 6 in.; depth, 16 ft; and gross tonnage, about 1,140 tons. The main engines are of the four-cylinder, four-crank type, and the boilers, single-ended, each having three furnaces, are constructed for a working pressure of 170 lbs. per square inch.

Platea.—On August 18th Messrs. Russell & Co., Port-Glasgow, launched a steel screw steamer named *Platea*, a duplicate of the *Gheronea*, launched by them a few months ago for the same owners, Messrs. William Thomson & Co., St. John's, New Brunswick. The dimensions are:—Length, 325 ft.; breadth, 48 ft.; depth, 25 ft. The steamer will carry 5,000 tons deadweight, and will be supplied by triple-expansion engines by Messrs. J. Kincaid & Co., Greenock.

LAUNCH.—Irish

Sado Maru.—On August 11th a large steel twin-screw steamer was launched from the North Yard of Messrs. Workman, Clark & Co., Limited, Belfast. She has been built to the order of Mr. A. R. Brown, Glasgow, for the Nippon Yusen Kaisha, of Japan, and she has been named the *Sado Maru*. The principal dimensions of the vessel are:—Length, 445 ft.; breadth, 49 ft. 6 in.; depth, moulded, 33 ft. 6 in.; and built to Lloyd's highest class and Board of Trade requirements for a passenger vessel. She is of similar dimensions but of somewhat different design to the *Kamakura Maru*, recently built by this firm for the same owners. The vessel will carry a large deadweight cargo on a moderate draught, and arrangements are made for loading and discharging with the minimum of time and labour. A large number of first, second and steerage passengers will be accommodated and many improvements have been introduced for their comfort and also for the navigation and safety of the ship. The machinery has been constructed at the builders' works, and consists of two sets of triple-expansion engines of the latest type, and capable of developing up to 3,500 I.H.P. After the launch the vessel was towed to her berth to receive her boilers on board.

LAUNCHES.—German.

Thauri.—On August 7th a passenger steamer built by the Flensburg Shipbuilding Co. for the Steamship Co. "Kosmos" in Hamburg, was launched. She has dimensions—383 ft., 40 ft., and 31 ft. The engines, of 1,700 H.P., are on the triple-expansion principle.

Hsi Ping.—On August 7th a steel steamer of about 2,140 tons was launched at Kiel; owned by the Chinese Engineering and Mining Co. Port of registry, Tientsin.

LAUNCH.—Denmark.

Venus.—On July 17th a steel steamer with two pole masts, of about 626 tons, named the *Venus*, was launched at Elsinore, owned by the Neptune Steamship Co. Port of registry, Bremen.

LAUNCH.—Holland.

Calaban.—On July 10th a steel steamer named the *Calaban* was launched at Rotterdam; owned by the Dutch East India Petroleum Exploration Co. Port of registry, Gravenhage.

LAUNCH.—Siam.

Ootradit.—On Saturday, July 3rd, the Bangkok Dock Co., Limited, launched from their building yard at high water a twin screw steamer for Messrs. Kim Seng Lee & Co., of Samsen, intended for both passenger traffic and towing. The principal dimensions are:—Length, 60 ft.; breadth, 13 ft.; and depth, 5 ft. She is designed chiefly for trading in the upper reaches of the river, and consequently has a very light draught, just drawing sufficient water to immerse the propellers. She will have an upper deck for passengers, and her extra breadth should ensure both comfort and safety. She will be fitted with two sets of compound engines having cylinders 6 in. and 10 in. diameter and a piston stroke of 8 in.; two steel marine boilers, 4 ft. diameter by 5 ft. long, all made by the Dock Co. As the vessel slid from the launching ways, she was christened the *Ootradit* by Mrs. C. S. George. Some interest will be taken in the performance of the new vessel, as she is the first twin-screw built here for the trade referred to. Her two propellers will give her greater advantage in turning the quick bends of the river, and extra power for towing and stemming the strong currents.

TRIAL TRIPS.

Meissen.—On July 12th the new screw steamer *Meissen*, built by the Flensburg Shipbuilding Co. for the Hamburg-Australian line, was taken on trial in the Flensburg fiord. This steamer has dimensions—403 ft., 48 ft., and 32 ft. The engines, of 2,500 H.P., gave an average speed of 14 knots.

Dr. Hansfurg Kiær.—On July 19th the trial trip of the s.s. *Dr. Hansfurg Kiær*, built by the Elsinore Iron Shipbuilding and Engineering Co., Elsinore, Denmark, to the order of Messrs. Hans Kiær & Co., Drammen, Norway, took place in the Sound. The vessel is built of steel to the highest class at Norwegian Veritas, and her dimensions are 220 ft. by 33 ft. 6 in. by 11 ft. 5 in. depth of hold. The engines are of the triple-expansion type, with surface condenser. During the trial trip the engines indicated normally 540 H.P., and the speed was 10¼ knots with a consumption of coal of only 1·37 lb. per I.H.P.

Oriel.—On July 19th the trial trip of the *Oriel* took place on the Mersey. She has been built by Messrs. Cochrane & Co., Birkenhead, to the order of the Missions to Seamen Society, for their Medway station, whither she is to at once proceed to her work. The result of the trial was most satisfactory, the rate of 9½ miles per hour being obtained over the measured mile against the 9 miles per hour anticipated per contract. Dimensions:—Length, 47 ft. 6 in.; breadth, 9 ft.; depth, 5 ft. 3 in.; draught, 4 ft.; cylinders, 5¼ in. and 10 in. in diameter by 8 in. stroke. There were on board in addition to the builders and Mr. Thompson, skipper of the yacht, the Rev. H. L. O'Rourke chaplain Mersey Mission to Seamen; Mr. F. R. S. Balfour, Mr. John Glynn, hon. secretary Mersey Mission to Seamen; and Mr. George Barclay, engineer to Messrs. John Glynn & Sons.

Glenarm Head.—On July 24th this fine steamer, built by Messrs. Workman, Clark & Co., Limited, Belfast, the latest addition to the fleet of the Ulster Steamship Co., Limited, went on her trial trip. The vessel is 360 ft. long, 45½ ft. beam, and 30½ ft. deep, with a carrying capacity of 6,200 tons, deadweight. She has a topgallant forecastle with accommodation for crew, long bridgehouse amidships, with large house on top, in which are saloon, captain's, officers', and passengers' rooms, and another house on after end with well-arranged mess-room and berths for engineers. Steam steering gear is in the poop, which is also fitted up with store-rooms and ice-house. The arrangements for working cargo are very complete, the six large hatchways being provided with nine steam winches and double derricks where required. A neat chartroom and a wheel-house built of teak are on upper bridge, where two of Lord Kelvin's compasses are placed; his sounding machine is also fitted aft. The vessel is rigged as a schooner, with two steel masts. The engines, which have also been manufactured by the builders are of the triple-expansion type, with cylinders 25 in., 42 in., and 68 in., with 48 in. stroke; steam is supplied by two single-ended boilers with Howden's system of forced draught. The vessel has a bronze propeller, a complete installation of electric light, and all modern appliances for a high-class cargo steamer. Captain M. R. Thompson is in command of the *Glenarm Head*. The trial trip passed off most successfully, and the vessel at once left for Montreal *via* Ardrossan.

Dunottar Castle.—On July 24th the Castle Co.'s Royal Mail steamer *Dunottar Castle* went on a trial trip in the Firth of Clyde, after undergoing extensive alterations at the hands of the Fairfield Co. This vessel, which is 5,535 tons, and is propelled by triple-expansion engines of 7,000 I.H.P., was built by them seven years ago, and in commission has proved one of the most popular boats in the South African service. When the *Dunottar Castle* went into the service she was one of the best of the South African fleet, and at the end of her twenty-ninth voyage her excellent condition reflected the highest credit on the work of the Fairfield Co. She has been overhauled from keel to truck, and numerous improvements have been made with the object of increasing the comfort of travellers. The enclosed spaces are airier and better lighted, and in the parts of the ship devoted to the first and second classes the state-rooms have been increased both in number and in size. On the bridge-deck have been placed several single-berth rooms, about whose remunerativeness there should be little doubt. More space on deck for the third-class passenger and roomier quarters for the crew have been provided by the lengthening of the forecastle; a new chart-room and wheelhouse, with a steering engine worked by Brown's

telemotor, have been erected on the upper bridge; and a more convenient entrance from the bridge-deck to the second-class quarters has been made. Newer and more commodious smoking rooms have been placed amidships; the apartment reserved for first-class passengers is specially attractive. Its panelling and framing are of richly figured solid oak, and the upholstery is in embossed morocco. Internally the vessel has been repainted and redecorated, and to all intents and purposes she is as good as when she first left Fairfield Dock. Mr. Gracie's staff have thoroughly overhauled the machinery, and brought it in every respect up to the highest state of efficiency. On the invitation of the Castle Line, a few ladies and gentlemen were on board during the trial cruise.

Alnmere.—On July 26th the new screw steamer *Alnmere*, built and engined by Messrs. John Readhead & Sons, South Shields, for Messrs. Fred A. Jaques & Co., Newcastle-on-Tyne, was taken to sea on her official trial trip. She is of the improved single deck type, and classed 100 A1 at Lloyd's, under special survey. She has a deadweight carrying capacity of 5,500 tons on a light draught. Her dimensions are:—Length, 322 ft.; breadth, 46½ ft.; depth, moulded, 26 ft. 11½ in. The engines are of the triple-expansion type, having cylinders 24 in., 40 in., and 64 in. by 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 100 lbs. per square inch. On her trial the vessel attained a mean speed of 11½ knots, the machinery working very smoothly and the trial altogether being satisfactory alike to builders and owners. After the trial the vessel returned to the Tyne to take in bunkers for Philadelphia.

Gallego.—On July 27th the steamer *Gallego*, belonging to Messrs. John Glynn & Son, went on her official trial trip, after having had new cylinders and boilers fitted for a working pressure of 180 lbs. per square inch, with Howden's forced draught. The engines, working at 74 revolutions, indicated 1,400 H.P. The foregoing work has been carried out by Messrs. David Rollo & Sons, engineers, of this city, under the direction of the company's consulting engineers, Messrs. George Hepburn & Son. Extensive alterations, giving greater cargo space, have also been effected. Messrs. Rollo have two more steamers in hand for the same company for somewhat similar alterations.

Olivemoor.—On July 29th the s.s. *Olivemoor*, a fine large steel screw steamer, built by Messrs. Wm. Grey & Co., Limited, for Messrs. Walter Runciman & Co., of Newcastle-on-Tyne, left West Hartlepool for her trial trip. The vessel has been built to Lloyd's highest class, and is of the following dimensions:—Length, over all, 336 ft.; breadth, 47 ft.; and depth, 24 ft. 10 in. The hull is built with web frames and cellular double bottom for water ballast. Triple-expansion engines of the well-known Central Marine Engine Works type have been supplied, having cylinders 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in. Steam is supplied by two extra large steel boilers, working at a pressure of 160 lbs. per square inch. After being manœuvred for the purpose of having the compasses adjusted by Mr. Gillie, of Shields, the vessel proceed to Blyth, where she is to load for Alexandria. When off the Tyne she was joined by Mr. Walter Runciman (managing owner) and a large party of ladies and gentlemen. The vessel and her machinery have been superintended during construction by Captain Runciman and Mr. W. P. Henry respectively, and these gentlemen, together with Captain Murrell and Mr. Jas. Lindsay (who represented the builders of the ship and engines respectively) were present at the trial. The trial was in every way satisfactory, there being no hitch or trouble of any kind, the vessel making an average speed of 11·6 knots.

Prince Edward.—On July 30th this vessel was taken on her trial run, and a very satisfactory result was obtained after extensive runs off Flamborough Head. The vessel, which has been built by Messrs. Earle's Shipbuilding Co., of Hull, to the order of the Dominion Atlantic Railway Co. of Canada, is specially designed for fast passenger and cargo service on the coast of Canada, and has been constructed under the supervision of Messrs. Flannery, Baggallay, & Johnson, of London and Liverpool. She is handsomely fitted for the accommodation of a large number of first-class passengers and a few steerage passengers, being fully equipped with electric light, artificial ventilation, and every convenience necessary for the comfort of the passengers. A very complete set of gear for prompt dealing with cargo is also provided. The boat is of the following dimensions: 268 ft. by 33 ft. by 13 ft., and is engined with treble-expansion twin-screw engines, having cylinders 19 in., 30 in., and 48 in., with a stroke of 24 in., taking steam from two large double-ended boilers under forced draught. The speed attained on trial was 18·15 knots, and it is confidently expected therefore that she will do the required 18 knots on her service.

Montcalm.—On July 31st the large new screw steamer *Montcalm*, which has been built by the Palmer Shipbuilding and Iron Co., Limited, of Jarrow, to the order of Messrs. Elder, Dempster & Co., of Liverpool, was taken on her official trip. The *Montcalm* has been specially designed for the cattle and general cargo trade, her dimensions being as follows:—445 ft. length, between perpendiculars, with 52 ft. beam, and 30 ft. 10 in. moulded depth. She is rigged as a four-masted fore-and-aft schooner, and carries about 8,000 tons deadweight on a moderate draught of water. The machinery is also by Palmer's Co., the engines being single-screw triple-expansion, with cylinders 30 in., 50 in., and 81½ in., by 54 in. stroke, steam being supplied by three large double-ended boilers, 180 lbs. working pressure. The steamer had her speed trials on the measured mile off Hartley, when she registered 13·34 knots, which was considered very satisfactory.

Ethelhilda.—On August 5th the s.s. *Ethelhilda*, a new steel screw steamer built by C. S. Swan & Hunter, Limited, of Wallsend-on-Tyne, was taken to sea to undergo her trial trip. This vessel, which has been built for Mr. J. H. Harrowing, of London and Whitby, is one of the new type of cargo steamers, built to the three deck rule with one deck laid and clear holds. She is 326 ft. between perpendiculars, by 41 ft. beam, by 27 ft. 1½ in. depth, moulded, with full poop, long bridge over the machinery space and topgallant forecastle, and water ballast carried in the cellular double bottom, and she is provided with a full complement of cargo discharging gear and all the modern appliances requisite for a vessel of this description. The steamer will carry a deadweight cargo of about 4,700 tons on moderate draught, or will carry a measurement cargo of about 5,500 tons. The machinery has been constructed by the North Eastern Marine Engineering Co., of Wallsend. The weather was all that could be desired for a trip to sea, and the party on board included a large number of the shareholders with ladies and gentlemen, amongst whom were Mr. Robert Harrowing, of Whitby, Mr. J. H. Harrowing, Mr. W. H. Attlay, Mr. Bourdas, Mr. Sissons, Miss Harrowing, Miss Attlay, Dr. Tinley, Mr. W. G Grimshaw, Mr. Middleton Smith, Mr. Key Harrowing, Mr. Crookston, Mr. S. Walton, and Mr. Taylor. The builders were represented on board by Mr. Geo. H. Hunter, the chairman, and Mr. Rowland Hodge; whilst the engine builders' representatives were Mr. Roland Philipson and Mr. Myles. The *Ethelhilda* was in light trim, with the propeller only partially immersed, and the speed attained during the trial trip was over 10 knots per hour. The machinery worked smoothly and satisfactorily in all respects, and a most enjoyable day was spent, after which the vessel steamed to Whitby, where the guests were taken ashore by the tug and the steamer proceeded on her voyage to Cardiff. During the construction the vessel and machinery has been superintended by Mr. John Crookston on behalf of Mr. Harrowing.

Sceptre.—On Saturday, August 7th, the s.s. *Sceptre* had her trial trip. She is the second steamer built by Messrs. Wm. Gray & Co., Limited, for Messrs. Hall Brothers, of Newcastle-on-Tyne, and is a fine type of a modern cargo vessel. Her length is 324 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. She has been built to Lloyd's highest class, and in regard to construction and outfit is in all respects similar to the previous ship, the *Ambassador*, which was sent to sea about a month ago. The engines have cylinders 23 in., 36½ in., and 62 in. in diameter, with 39 in. piston stroke, and there are two large steel boilers working at a pressure of 160 lbs. per square inch. Compasses having been adjusted by Mr. Berry, a run was made to try the vessel's capabilities, when it was found that an average speed of 11 knots had been made, the engines running at 76 to 77 revolutions per minute. Great satisfaction was expressed with the performance of both ship and machinery by those interested. Amongst those present were:—Mr. John Hall and Mr. M. Mein, partners; Mr. Reid, Belgian Consul, Newcastle; Mr. Brewis, of London; Captain Harrison, Newcastle; Mr. T. Williams, Jarrow; Captain Lowrie and Mr. R. Williams, superintendents of ship and machinery respectively; Captain Murrell, shipbuilders' representatives; and Mr. J. B. Williams and Mr. James Lindsay, engine-builders' representatives. On the conclusion of the trial the vessel, under the command of Captain Smith, proceeded on her voyage to New York to load her first cargo.

Uller.—On August 9th the new steel cargo steamer *Uller*, built by Messrs. J. Priestman & Sons, Southwick, to the order of Mr. Hjalmar Roed, of Tonsberg, was taken to sea for her official trial trip. The principal dimensions of the vessel are as follows, viz.:—Length, 281 ft.; breadth, 39 ft. 6 in., and depth, moulded, 17 ft. 8 in. She has been constructed on the partial awning deck principle; four steel bulkheads divide the vessel into watertight compartments, and a double bottom for water ballast is fitted in each hold, the after peak being also used as a water-ballast tank. A large deckhouse is fitted on the awning deck, containing a handsome saloon and accommodation for the captain and ten passengers. The engineers and officers are berthed at the after end of the engine casing under the awning deck, and the crew forward. The vessel is fitted up with a complete equipment of winches and derricks, &c., for the rapid loading and discharging of cargo, and both the vessel and machinery have been constructed to the highest class of Det Norske Veritas. The engines, which are of the latest improved type on the triple-expansion principle, and have cylinders 20½ in., 34 in. and 56 in., by 39 in. stroke, steam being supplied by two large boilers working at a pressure of 160 lbs., have been constructed by the North-Eastern Marine Engineering Co., Limited, of Wallsend. The vessel, in light trim, was taken several times over a measured mile, the engines working without a hitch, and a speed of 12·2 knots was easily maintained, which was considered very satisfactory. The shipbuilders were represented at the trial by Mr. Priestman, and the engine-builders by Mr. Summers Hunter. During construction the vessel and machinery have been superintended by Messrs. A. Macfarlane & Co., of Sunderland.

Orwell.—On Tuesday, August 10th, the s.s. *Orwell*, recently launched from the yard of Messrs. Charles Connell & Co., Whiteinch, and built to the order of Messrs. James Gardiner & Co., Glasgow, went down the river on her official trial trip. A run was made down the Firth as far as the south end of Arran, which was much enjoyed by the large company of ladies and gentlemen on board. The working of the machinery and the results were highly satisfactory to the owner and builders, a speed of about 12 knots being attained under easy steaming. The engines, which are of the triple-expansion type, indicated about 1,700 H.P., were fitted on board by Messrs. Dunsmuir & Jackson, Govan, and have all the latest improvements for economical working, including Howden's forced draught. The vessel and machinery were built under the superintendence of Mr. John M'Kenzie the company's superintendent engineer.

Chebucto.—On August 12th the trial trip of the ferry steamer *Chebucto* took place. The steamer has been built by Messrs. John Shearer & Son, Kelvinhaugh Slip Dock. The *Chebucto* is a vessel of 600 gross tonnage, and is of a novel type. Both ends are alike, and at each there is a screw propeller and rudder. The underwater body and ends of the vessel are yacht-like in fineness. The vessel is built for special goods and passenger ferry traffic between Dartmouth and Halifax, Nova Scotia. The main body is constructed of steel to Lloyd's highest class, with heavy deck beams, supported by longitudinal truss channel girders, each side of the vessel for cart and carriage traffic. These beams are carried out in one length to the extreme width of the vessel, forming the sponson deck. The wings are part of the integral structure, being supported by the outward sweep of the ship's frame and shell plating. On these wings are two spacious houses, each about 100 ft. long by 10 ft. 6 in. wide by 13 ft. high, seated all round with handsome curve back settee chairs, divided by electro-plated elbows, affording seating accommodation for 222 passengers. The woodwork of the house is a combination of cherry-wood and yellow pine. There are two tiers of windows in the sides, the upper tier being filled in with cathedral glass. The ornament is very chaste, a fine effect being produced by the introduction of a light band of lincrusta of elegant floral festoon design. On the hurricane deck two pilot-houses (one at each end) are placed, containing the steering gear for each end of the ship. Extending over the hurricane deck and embracing the pilot-houses a light awning deck is fitted, shading a very commodious arrangement of deck seats of elegant construction. The cabins are heated by a thorough system of steam radiators. The engines, constructed by Messrs. M'Kie & Baxter, Copeland Works, Govan, consist of two pairs compound surface condensing engines built on one bed-plate, and with the low pressure receivers separated only by a division plate, the cylinders are bolted together in line; the two low-pressure cylinders inside and the two high-pressure cylinders outside. When both engines are working, as is the case when the vessel is on her station, she is propelled by a double compound four-crank engine, two high-pressure cylinders 12 in. diameter, and two low pressure cylinders 24 in. diameter by 18 in. stroke. The machinery was built under special survey by Lloyd's and Board of Trade for a passenger certificate. Each of the propellers is 6 ft. 3 in. diameter by 8 ft. 3 in. pitch, four blades, 15 square feet surface, and both front and back faces of the blades are of the same shape. The cooling surface in the condenser is 500 square feet. The centrifugal pump has a 5 in. suction and discharge, and is driven by a 5-in. by 5-in. condensing engine, the fan of this pump is 20 in. diameter. The boilers are of the Admiralty type, two in number, 7 ft. 6 in. diameter by 18 ft. long; the total grate surface is 54 square feet, and the total heating surface is 1,700 square feet; each boiler has two Fox's furnaces, 36 in. diameter by 7 ft. 9 in. long. The reversing engine has a 7-in. cylinder. The pumps, supplied by the Blake & Knowles Co., are as follows:—Air pump, 1 ft. 6 in. cylinder, driving direct without rotary motion, a pair of air cylinders 12 in. diameter by 8 in. stroke. Main feed pump, 5½ in. by 3½ in. by 6 in.; donkey pump, 4½ in. by 2½ in. by 4 in.; sanitary pump, 3 in. by 2 in. by 3 in.; boiler circulating pump, 3 in. by 2 in. by 3 in.; the four latter pumps being of the Blake & Knowles special horizontal duplex type. We understand that the air pump is the first of its kind that has ever been fitted to a vessel in this country, although they are coming into much favour in the States. The pump actually fitted was intended for a vessel of the American Navy, but was given to us in order to comply with the delivery requirements. An installation of electric lighting has been fitted throughout. The electric lighting engine has a 5 in. by 5 in. steam cylinder. Regarding the trial, which was made with both engines coupled together and which gave most satisfactory results, the following are the particulars:—Draught, 9 ft., including keel displace-ment, 392 tons; immersed midship section, 169·6 square feet; length, between perpendiculars, 124 ft. 6 in.; breadth, on water line, 30 ft.; revolutions, 160; I.H.P., 400; speed, 10 knots; speed of air pump, 32 strokes per minute; steam, 125 lbs.; vacuum, 26 in. Immediately after the trial one of the engines were disconnected and its shaft allowed to revolve freely, and when in this condition a speed of nearly 9 knots was registered. Due to the motion of the vessel through the water the disconnected shaft was making about 60 revolutions per minute. The disconnected shaft was, of course, only turning up to the thrust block, the trip left the Central Station in the morning at 10 o'clock, engine remaining stationary. The company invited to the journeying to Gourock, where they joined the steamer. Among those present were Councillor Shearer, Capt. D. Macpherson, and Messrs. M'Kie, Baxter, Wilson, Cochrane (Board of Trade), and Austin (of Lloyd's). The trip was favoured with fine weather. The sun shone genially, and there was only the gentlest swell on the water. The steamer did the measured mile, and registered 10 knots an hour—which for a vessel of her class is a thoroughly worthy performance. Afterwards a pleasant run was made up Loch Long. The vessel left the Clyde on Saturday, August 14th, and started upon her voyage to Nova Scotia on Sunday, August 15th, and it was considered advisable, to prevent strains in the shafting which would otherwise exist, that the engines should work independently, *i.e.*, uncoupled, where the two crank shafts join, and, contrary to expectation, the after shaft was making 160 revolutions per minute, whereas the forward shaft only made 148, although when the same forward shaft was running freely and not driven by the engine, it made about 60 revolutions. The weight of the machinery department, with steam up and fresh-water tank full, was 90 tons. Upon all the trials there was an abundance of steam. It was remarkable the entire absence of vibration when both engines were working as on the official trial, but this could not be said when only one engine was in operation. The reversing engine gave complete satisfaction in every way, and it was remarked that it would have been as easy to couple the ship's telegraph direct to the starting engine as to work it from below, as the signals were responded to as quickly, if not more so, than it was possible to follow with the reply telegraph. The starting engine is decidedly a feature, as it entirely dispenses with the necessity for the hydraulic cylinder, which has been so constantly in use up to now. The engines can be reversed at almost any speed, and from the construction of the gear it is quite impossible to do damage or carry anything away. The principal features of this gear, and also Mr. Baxter's

patent slide valve, we will have pleasure in giving details of later on. It was remarked by several unprejudiced engineers aboard that they had never before seen such a handy starting engine.

Bucuresti.—On Friday, August 13th, the s.s. *Bucuresti*, built by Messrs. R. Napier & Sons, Limited, for the Direction Generale of the Roumanian State Railways, had a very successful trial, when all the conditions of the contract were fully implemented. The *Bucuresti* is the second of three steel screw steamers to carry 3,500 tons which Messrs. Napier have on hand for the Government railway service, and are designed to develop the important traffic between the Roumanian ports and Western Europe, bringing grain in bulk and returning with coals. The general dimensions are 300 ft. by 39½ ft. by 24½ ft., with a topgallant forecastle, long bridge, and full poop, and constructed on the deep frame principle, with a cellular double bottom all fore and aft. built to the highest class at Bureau Veritas under special survey, and supplied with the most modern appliances for the efficient working of the ship and the rapid handling of cargo, including a complete installation of electric lighting throughout the vessel. The machinery consists of a set of triple-expansion engines, having cylinders 22 in., 35 in., and 58 in. diameter by 3 ft. 3 in. stroke, with two single-ended boilers for a working pressure of 178 lbs., and fitted with the most recent improvements for efficiency and economy, including centrifugal circulation pumps, bronze propeller, &c. After a series of stringent trials for speed and consumption the owners' representatives expressed themselves as highly satisfied with the favourable results, the contract speed having been maintained for the stipulated time with the specified deadweight on board upon the guaranteed consumption of coal.

Coningsby.—On August 14th the screw steamer *Coningsby*, built by Messrs. Ropner & Son, of Stockton-on-Tees, to the order of Messrs. Gladstone & Cornforth, of West Hartlepool, made her official trial trip in the Tees bay, and an average speed of 12 knots on a three hours' trial was obtained, this being considered exceptionally good. This steamer has been built under the supervision of Mr. Brockett and Captain Smith, who were present at the trial. The steamer is of about 4,800 tons deadweight, and is fitted with the builders' patent "trunk," the machinery being supplied by Messrs. Blair & Co., Limited.

Port Phillip.—On August 14th the large new steamer *Port Phillip* left the Tyne on her trial trip. This vessel, which is one of the latest developments of a modern light draught cargo steamer, has been built by the Tyne Iron Shipbuilding Co, Limited, Willington Quay, to the order of Messrs. William Milburn & Co., of Newcastle and London. Her principal dimensions are:—Length, 325 ft.; breadth, 48 ft. 6 in.; depth, 24 ft., and the vessel is fitted with complete equipment of winches and derricks for the rapid loading and discharging of cargo. The machinery, which has been built by the North-Eastern Marine Engineering Co. Limited, Wallsend, consists of a powerful set of engines, with cylinders 23 in., 38½ in., and 64 in. by 45 in. stroke, and two large boilers working at a pressure of 180 lbs. The trial of both vessel and machinery proved in every way satisfactory. Mr. J. D. Milburn was present during the trial, and also Mr. Bone, representing the shipbuilders; and Mr. Philipson the engine builders. During construction the vessel and machinery have been superintended by Mr. R. Moffitt, of Newcastle.

Cathcart Park.—On August 20th, in rather unfavourable weather, the trial trip of the *Cathcart Park*, a steel screw steamer of 850 tons gross, built by Messrs. Carmichael, M'Lean & Co., Greenock, took place on the Clyde. This vessel, which has been built to the order of Messrs. J. & J. Denholm, Greenock, is of the following dimensions:—Length, 208 ft.; breadth, 29 ft. 9 in.; and depth, 14 ft. 6 in. She is constructed for carrying sugar and general cargoes. The engines, of triple-expansion type, were supplied by Messrs. Hutson & Son. The cylinders are 16 in., 26 in., and 44 in. by 33 in. stroke, for a working pressure of 160 lbs. The vessel underwent successful trials between the Cloch and Cumbrae lights, and also attained a satisfactory speed over the measured mile.

Fenchurch.—This vessel, which was launched from Messrs. Gourlay Bros.' yard last month, was taken for trial at sea on August 20th. She is built for Messrs. David Bruce & Co., of London and Dundee, under the inspection of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, and is of the following dimensions:—Length, 330 ft.; beam, 45 ft.; depth, 27 ft., and is built in accordance with the three-deck rule and to Lloyd's highest class. The deck machinery consists of powerful helical-geared winches by the builders, and direct steam windlass on forecastle head. The steering gear is worked by steam, the engine being placed in the engine-room is under the direct supervision of the engineer, and has straight leads direct to the tiller-head; powerful hand-gear is also fitted for use when desired. A large donkey boiler of the return tube type is fitted in casing on main deck. She carries water ballast fitted in cellular bottom under fore and after-holds. Her accommodation has been specially designed for her intended services, the crew being berthed forward in topgallant-forecastle, and the captain and officers are placed on bridge-deck, with handsome and well ventilated saloon, with pantry, &c., adjacent, and engineers under bridge deck, close to their duty, with bath and mess rooms, &c. Wheelhouses and store-rooms are fitted aft, and special arrangements are made for stowing with a minimum of trimming a very large amount of reserve bunkers when desired for a long voyage. Her machinery is of the quadruple type, having cylinders 19½ in., 28 in., 40 in., and 57 in. diameter by 42 in. stroke, supplied by steam of 210 lbs. pressure from two powerful boilers with large heating surface. She is fitted with Howden's forced draught with heating arrangements for the blast and feed water; three independent means of boiler feed are fitted, also evaporator and filter for boiler feed, and distiller for drinking water, besides other modern improvements. The ship left for trial at eleven o'clock, and proceeded to sea, when the whole of the machinery behaved in a most satisfactory manner and without the slightest hitch, and the ship afterwards returned to prepare for taking up her service.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from July 7th to August 6th, 1897.

16098 D. Pounds. Screw propellers.
16119 W. Griffiths. Lubricators.
16122 H. W. Ibbotson. Saving vessels at sea.
16130 W. Frost. Hooks for use in ships' cabins.
16161 R. L. Gurden. Rotary pumps.
16174 R. Russell. Rotary engines and pumps.
16192 C. Day. Indicating waste boiler gases.
16193 J. Dugill, jun. Gas and oil motor engines.
16231 F. Hansen. Rotary steam boiler.
16325 S. Z. de Ferranti. Submarine cables.
16337 A. Harcourt. Internal combustion engines.
16340 E. Allnut. Rowing boats.
16371 O. F. Conihe. Valves.
16376 H. R. Mortell. Otter boards for trawling.
16379 R. Klinger. Production of asbestos fabric.
16409 A. M. Clark (A. A. Graham, United States). Propelling vessels.
16420 A. Nicholas. Valve.
16450 J. Ogilvie. Boat chock.
16459 C. J. F. de Vos. Securing boats on ships.
16460 E. P. Waggoner. Steam generators.
16499 F. and C. Claparède. Shallow draught screw-propelled vessels.
16597 B. F. Murphy. Rotary steam engines.
16599 B. F. Kelley. Water heater and purifier.
16615 J. E. Beckman and J. F. Berrick. Condensing steam.
16628 C. Bonger. Ship's anchor.
16635 C. F. C. Lohmann. Rotary steam motor.
16703 C. R. Wedelin. Apparatus for dredging.
16706 L. G. Fitzmaurice. Internal combustion engines.
16729 A. G. New. Engines.
16755 F. J. Burrell. Steam generators.
16781 A. Pass. Apparatus for raising vessels.
16787 W. Lockwood. Method of generating steam.
16798 A. J. W. P. M. Davis. Boat-raising apparatus.
16820 H. Godsal. Torpedoes.
16827 J. Sampson. Steam generators.
16829 J. K. Broadbent. Steam generator furnaces.
16845 M. C. Killig. Furnace draught indicators.
16913 E. Cochnis. Regulating feeding water in boilers.
16943 S. Robinson and E. M. Molyneux. Pistons.

16958 H. Seiffert. Steam generating apparatus.
16988 A. J. Thompson and H. J. Hayes. Steam engines.
16990 W. Whiteley (E. P. Holly, United States). Feeding water to boilers.
17009 G. Edwards and J. Winter. Funnels.
17025 J. Tuma. Phases of alternating currents.
17041 W. Schalkau. Armour-plated shields.
17053 J. Bernays. Centrifugal pumps.
17054 T. Makepeace and A. S. Fowles. Propellers.
17070 W. Whiteley (E. P. Holly, United States). Steam generators.
17134 G. Cuccotti. Boilers.
17161 G. B. Shepard. Rotary engines or pumps.
17214 J. and R. Derbyshire. Pistons.
17227 A. Svorono (E. Courcoumely, Russia). Avoiding sea collisions.
17253 G. L. Fry. Non-exhausting engine, &c.
17269 M. Blair and H. Parkinson. Means for preventing the racing of screw propellers.
17309 J. Lewthwaite. Breakwaters.
17384 J. F. and A. Devoe. Steamboat propeller.
17411 A. S. F. Robinson. Engine governors.
17437 J. J., T. F., and J. W. Meldrum. Supplying air for furnaces.
17536 C. F. Flodqvist and C. G. Anderson. Armour plates.
17577 A. S. Wylie. Engine governor.
17591 W. McG. Greaves. Steam boiler furnace.
17605 C. A. Allison (M. R. Sherrard and D. W. French, United States). Connecting pipes.
17619 B. Klazkin. Engine.
17622 E. W. Lloyd and A. G. Hadcock. Torpedoes.
17645 A. J. Boult (J. W. Glaholm, Canada). Screw steamers.
17653 W. B. Fitch. Boats.
17697 A. M. Monteath. Compensating compass.
17717 E. L. B. Hill. Feeder for lubricating purposes.
17744 J. Heron. Cranks.
17752 W. Morris and L. Wilkinson. Funnel.
17770 J. Thom. Slide valves of engines.
17842 G. A. Marconnot. Thermal expansion engines.
17845 P. Marchand. Steam engines.
17857 A. Dobson. Valves for steam engines.
17890 G. A. Mussbaum. Boilers.
17896 E. Richardson and N. H. Mountford. Reducing vibration.
17909 F. E. and W. H. Wyatt. Steering boats.
17910 F. E. and W. H. Wyatt. Propulsion of boats.
17917 C. T. Dörr. Closing bulkhead doors.

BOARD OF TRADE EXAMINATIONS.

Extra First Class.

July 24th, 1897. Harrison, W.... Ex. 1C N.Shields
" " " James, W..... Ex. 1C Liverpool
" " " Macdonald, J. F. Ex. 1C Glasgow
" " " Neill, A. J..... Ex. 1C London
" " " Neal, F. W..... Ex. 1C S'nd'land

Note.—1C denotes First Class; 2C, Second Class.

July 17th, 1897.

Allan, J..... 2C Dundee
Barnes, J..... 1C N.Shields
Battle, A. E.. 1C London
Chapman, H.. 2C N.Shields
Coop, H..... 1C Hull
Crispin, R. C.. 1C Dublin
Cromar, C. A.. 2C Greenock
Edward, A. S.. 1C Dundee
Elder, W. G.. 1C Greenock
Ferrier, A. B... 1C "
Fleming, M.... 2C London
Fleming, R..... 2C Dundee
Gidney, H. F... 2C N.Shields
Glasspool, J. H. 1C London
Hicks, J. B..... 2C "
Holmes, R. A... 2C Hull
Horton, George 1C Liverpool
House, W. J.... 1C Hull
Hume, A. G.. 2C London
Lonmon, A..... 1C "
MacKenzie, J. H. 2C Greenock
McNaughton, W. 1C Liverpool
Milley, John ... 2C "
Moser, J..... 1C Dublin
Ogden, Cuthbert 1C Liverpool
Patrick, A..... 2C Dublin
Phillips, Frank. 2C Liverpool
Rake, John W.. 2C "
Revell, W. G.. 1C Hull
Rintoul, W..... 1C London
Robb, G. McG. 2C "
Robertson, J. G. 2C Greenock
Robson, F. G... 1C Liverpool
Scott, A. W.... 1C N.Shields
Shankland, A.. 2C "
Smith, V. E.... 2C Greenock
Sunderland, R.. 1C Liverpool
Sutcliffe, E.... 2C N.Shields
Sutherland, J... 1C Greenock
Thompson, H. E. 2C Liverpool
Watson, J. W.. 2C Greenock

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from July 24th to August 24th, 1897:—

Abbott, Henry, engineer to the *Crane*.
Amor, Edward R., assistant engineer to the *Talbot*, to date August 3rd.
Arthur, J. F., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Anstey, H. C., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Austin, Fredk. W., engineer to the *Hotspur*, to date August 2th.
Baldwin, G. W., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Barter, F., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Block, R. J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Bowing, J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Brown, P. R. T., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Carruthers, D. J., engineer to the *Spitfire*, to date July 30th.
Cleave, T. W., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Cliff, Harrold (probationary), assistant engineer to the *Majestic*, to date July 23rd.
Collingwood, Richard, acting chief engineer to the *Hazard*, to date August 19th.
Coomber, Thos. G., fleet engineer to the *Hydra*, to date July 21st.
Crichton, W. H., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Crisp, Arthur S., engineer to the *Whiting*, to date August 10th.
Curtis, F. T. W., chief engineer, advanced to the rank of staff engineer in Her Majesty's fleet.
Darley, Herbert I. (probationary), assistant engineer to the *Northampton*, to date August 19th.
Ferguson, S. P., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Fraser, Geo. F., fleet engineer to the *Vivid*, additional for the *Northumberland*, to date July 23rd.
Graham, J. E. D., staff engineer, has been advanced to the rank of engineer in Her Majesty's fleet.
Grant, W. H., staff engineer to the *Vivid*, additional for the *Edgar*, to date July 23rd.
Gregg, C. J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Hammond, H. T., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Heppel, Walter G. (probationary), assistant engineer to the *Empress of India*, to date August 7th.
Hockey, S., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Jameson, T. O., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Jeffery, Geo. H., assistant engineer to the *Hazard*, to date August 19th.
Kent, Walter J., engineer to the *Sparrowhawk*, to date August 19th.
Kestell, E. R., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Kingston, F. J., engineer to the *Hearty*, to date July 23rd.
Leahy, J. P., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Leighton, W. J., assistant engineer, has been promoted to the rank of acting engineer in Her Majesty's fleet.
London, Arthur J., staff engineer to the *Hotspur*, to date August 12th.
Milton, Wm., staff engineer to the *Ariadne*, to date August 3rd.
Mortimer, John E., engineer to the *Australia*, to date August 9th.
Nicholson, Gilbert C., engineer to the *Rambler*, to date August 3rd.
Parsons, W. R., engineer to the *Thrasher*, to date August 10th.
Paterson, George T., engineer to the *Phaeton*, to date August 9th.
Pearce, Thos., temporary, assistant engineer to the *Vivid*, to date July 23rd.

The Marine Engineer.

LONDON, OCTOBER 1, 1897.

THE accident to the warship *Bruix* of the French Navy whilst acting as an escort to President Faure on his way to Cronstadt has raised as much of a storm amongst our neighbours as if the vessel carrying the President had foundered in fine weather. But it was only the piston rod of the high-pressure cylinder that broke, splitting the end of the high-pressure cylinder. The *Bruix* was able to return to port at the very respectable speed of 10 knots without her high-pressure cylinder. The Government to save their necks have had to appoint a commission of enquiry, and they may esteem themselves lucky if they do not receive a vote of want of confidence owing to the slight disaster. It is almost impossible for us to realize the serious way in which such trivial matters are visited upon the Government in France, and our amusement is but deepened when we peruse the extraordinary discussions and explanations adduced in mechanical matters by French scientific journals, which should at least know what they are talking about or leave such subjects alone. It is a wonder that the accident has not been ascribed to treachery induced by the gold of *la perfide Albion*. In this case, however, a so-called scientific French journal has undertaken to analyse the cause of the accident, and at the same time gives a most laughable theory as to the breakage of cylinder covers by priming. Priming is said to be the entraining of water with the passing stream of steam from condensed water in the pipes of communication, and we are sure our readers will be enlightened on being told that should an ultimate rupture of the cylinder cover take place it is caused by the solid deposit of salts between the piston and cover by the re-evaporation of water in the cylinder. The writer appears to see some difficulty in this theory, as the boilers are now usually fed with fresh water, but he ingeniously gets over this difficulty by stating as a fact that there is sufficient leakage between the circulating water and the steam tubes in the surface condensers to account for this deposition of salts between the piston and cover. The loss of economy in fuel, when priming occurs, is put down to the grinding effect that takes place between the piston and cylinder by this deposition of salts. It is extraordinary that our neighbours in France, who are worthy competitors in engineering as in other industrial and scientific pursuits, should allow themselves without protest to be represented by so-called technical journals, or by an excitable press, which bring absurd charges against their political leaders, and which make statements so absurd as to show only their ignorance of the elementary facts about which they write.

As water-tube boilers are likely to be used for the future to a much larger extent than has hitherto been the case, any information as to their particular peculiarities should be of importance to our readers. Such a peculiarity was the subject of a very bitter lawsuit in the United States about two years ago, the defendants being the makers and suppliers of the Root water-tube boiler. About 3,500 H.P. in such boilers had been supplied to the Philadelphia Edison Electric Light Co., and soon after these boilers had been supplied, a series of troubles supervened which culminated in a fatal accident. The Root Manufacturing Co. were exonerated by the Coroner's court, but the Electric Light Co. considered they had grounds for an action at law with enormous damages against the Root Manufacturing Co. The series of accidents were always of the same character, viz., the breaking of bolts holding the caps or connecting bends of the small cast headers at the ends of the tubes; such bolts always breaking off under the heads with a short crystalline fracture, which, perhaps, not unnaturally caused the plaintiffs to suppose that the accidents were caused by poor material or bad workmanship, or by crystallization of the bolts having taken place in use. The defendants had endeavoured to prevent the recurrence of the accidents by the substitution of fresh bolts, both of the best rivet iron and steel, and even changed the diameter from $\frac{5}{8}$ of an inch to $\frac{3}{4}$, but all without avail. The accidents recurred in exactly the same way and with the same appearance of fracture. This fracture was most peculiar. There was no diminution of section by elongation at the point of fracture, as would be the case with malleable or ductile metal under extreme breaking longitudinal strain. The material of the broken bolts were subjected to severe tests, being hammered out, and bent double cold. In all cases the bolts showed excellent qualities of tenacity and malleability, which entirely disposed of the theory that they were or had become crystallised. The only explanation of the fracture, without diminution of sectional area at point of fracture, that could be conceived, was, that it had resulted from a sharp and sudden blow or blows which fractured without giving time for the usual elongation. But how could such a blow exist or be generated within a boiler? The circumstances, then, of the method of handling and working the boilers investigated, and it was found th

been to the stokers to keep up steam supply at any cost, and that, in consequence, they had been pushed by a forced draught of three to four inches of water-head, to develop on occasion as much as 100 per cent. above their rated capacity. It was found also that the tubes were internally incrusted with scale varying in thickness from 5-16ths to 1 inch, thus closing down materially the area of the tube opening. This incrustation had resulted from the very impure feed-water used for the boilers and probably was increased by the large variety of chemicals used with the water in the hopes of ameliorating its character. Such incrustation, which was so hard that it required a hammer and chisel to remove it, could not but have had the effect of rendering all parts which should have been flexible extremely rigid, and also had caused the burning of some of the tubes. The closure of the effective area of the tubes under the extreme forcing for steamgeneration gave the clue to the cause of fracture of the bolts by "water hammer," which was demonstrated and proved by the defendants upon the following theory: The tubes having the necessary capacity, when clean, to admit a natural circulation of water and steam to the upper inclined ends of the tube, would be found unable to pass the necessary amount of water and steam when choked as they were at the upper ends by scale, particularly under the excessive forcing to which they were subjected. The steam would thus collect and be forced back to the lower end, driving back the entering colder water, until the steam so accumulated forced itself out of the lower ends of the tubes in a large bulk in contact with the much colder supply water. Here an immediate vacuum would occur, as in the case of the well-known action of the Pulsometer pump, and the cold supply water entering the vacuum in the water-tube would rush through the tube with infinite velocity, producing an impact of comparatively cold water upon the upper caps and connections of the tubes amply sufficient to break and destroy any obstruction. It was therefore argued that it was extremely lucky that the parts meeting the impact were small in area, thus limiting the consequent disaster and explosion. The judge and jury seem to have been thoroughly convinced of this theory of the cause of the constant accidents as they gave a verdict in favour of the defendants; and the moral evidently is that if water-tube boilers are apt under certain circumstances to develop "water-hammer," proper and intelligent care must be given to keeping the tubes clean and of proper orifice, and to force them only with discretion.

As a sequel to the scheme referred to in our former issue of September for the shortening of the route from Great Britain to New York, *via* Newfoundland and Nova Scotia by rail, we must take note of a scheme at present being considered by the United States Government for an ocean ship canal wholly within the United States from the Hudson River, through the Oneida and Ontario Lakes to Lake Erie, which it is estimated would cost £40,000,000 to complete, and require £400,000 per annum to keep up. So far, however, the expert reports are that such a canal, if constructed, would have no military value and is not a project worthy of being undertaken by the general Government, as the benefits to be derived therefrom would not be properly commensurate with the cost; on the other hand, it is recommended that all that can be desired by the internal traffic can be effected at one quarter the cost by the deepening and enlarging of the Erie Canal to a size sufficient for 1,500 ton barges, and by making also the necessary alignment to give a continuously descending canal all the way from Lake Erie to the Hudson, and canalising the Mohawk River. Such an improvement, it is stated, would enable freight to be transported between the East and West at a lower rate than by ship canal on large lake or ocean vessels, as it is quite an open question whether ocean vessels would avail themselves of such an inland canal, even if it existed.

The strike and consequent lock-out in the engineering trade is still dragging its weary length along, without any definite result being yet arrived at, though, no doubt, with great mischief to our industries in engineering and dependent trades. It is a pregnant fact that our trade, as estimated by the Board of Trade returns, has begun a considerable decline under all heads in the month of August. The return of busy times, upon which the whole nation was congratulating itself, has now at least been deferred if not destroyed. Is this a time for the workmen to attempt to force upon trade restrictions which, whilst they will retard output, will not, it is believed, benefit the men themselves in any way? If they got their extra hours of leisure what would they do with them? Let the wives and children honestly answer this question. Our foreign competitors are laughing in their sleeves at our dilemma, and pocketing the orders that should have come this way. One of the leading shipbuilding firms on the Tyne has had a communication from a large steamship company on the Continent to the effect that they contemplate building another steamer, but will not even invite tenders from British shipbuilders. They will not leave the delivery of such boats to the mercy of the British trade unions. No one wants to prevent fair combination amongst workers to get the highest price for their labour, but they must do such combining fairly. No benefit funds should be available for trade warfare, as the irresponsible managers thus only cheat their ignorant

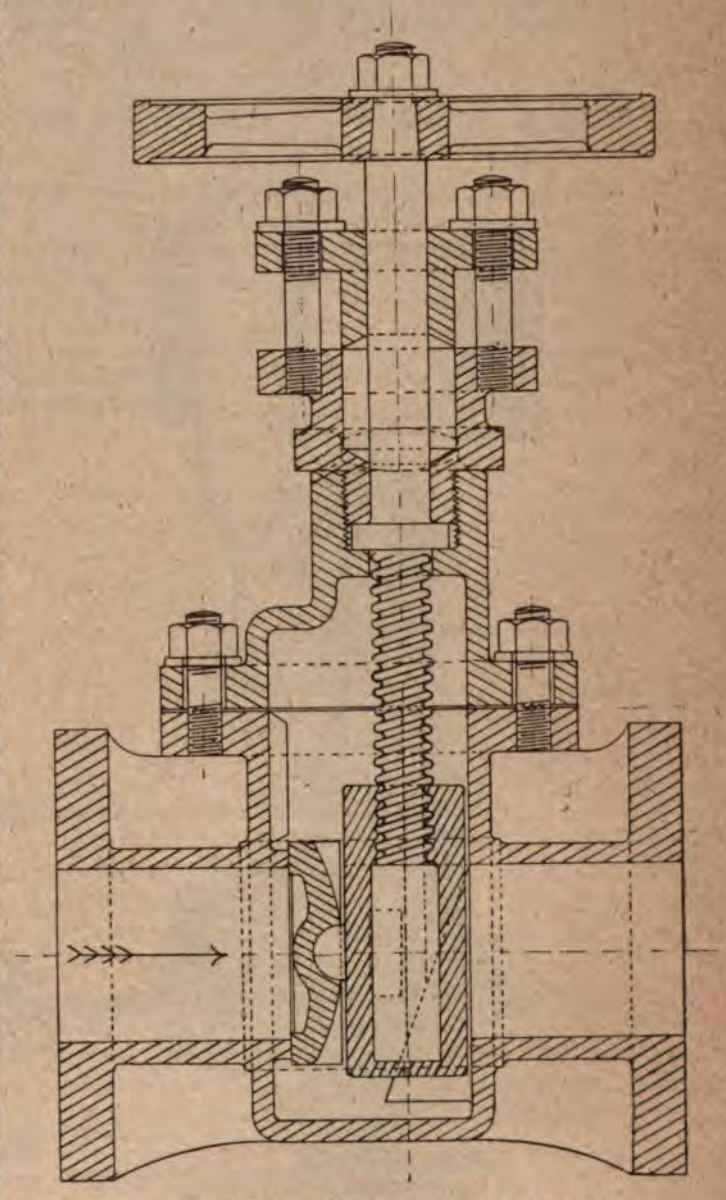
subscribers. Let the benefit and warfare funds be kept quite distinct by legal enactment, and if then the men desire to subscribe to the warfare fund let them, but no refusal to do so should affect their claim upon the benefit funds. It is well known this is not so at present. As an example, Messrs. Denny & Co., of Dumbarton, have ever endeavoured to maintain a neutral attitude in trade disputes, and have, therefore, refrained from joining the federated employers. They naturally, however, desire such society engineers as may be in their employ to maintain the same neutral attitude, and, that whilst not objecting to their paying the usual subscription for benefit purposes. they request them to refrain from subscribing to levies for the maintenance of the strikers. The men, however, have replied that if they do not pay the strike levies as made by thesociety, they will lose all the benefit due to them for over thirty years' subscriptions in many cases. This is the tyranny of the trade unions, upon the personal wishes of their members, which can only be abrogated by immediate legislation as to the distinction between benefit and warfare funds, and a limitation of the powers of the trustees to deal with benefit funds. Picketing also should be made illegal, as it is of no benefit to the strikers, unless used as a means of hidden intimidation. The numerous cases of proved overt intimidation and even violence show the natural result of picketing. The country as a whole is sick of these industrial warfares, and would welcome any legislation to remove their abuses.

THE "HOLGATE" RE-GRINDING STRAIGHT WAY VALVE.

WE have pleasure in bringing to the notice of our readers a new type of straight-through full-way valve, which has been invented and patented by Mr. C. H. Holgate, of School Close Works, Leeds. This valve is illustrated in adjoining diagram in sectional elevation.

It will be seen from the illustration that its construction differs from any ordinary valve, and such differences have been made with a view to making a simple valve which is easily repaired. Upon the screwed spindle a nut is engaged, the back side of which is provided with an inclined face, which is adapted to engage against another inclined face upon or let into the valve box casting in such a way that the downward movement of the nut produced by the screw causes the nut to move forward in a direction normal to the axis of the screwed spindle. Upon the front side of the wedge the valve is supported by means of a ball-and-socket joint. Now, it will be readily seen on turning the spindle in a proper direction, the nut and valve will be lowered down so that when the valve is opposite the valve face, the nut engages with the inclined face, and the further downward movement forces the valve tightly against the face in the valve casing.

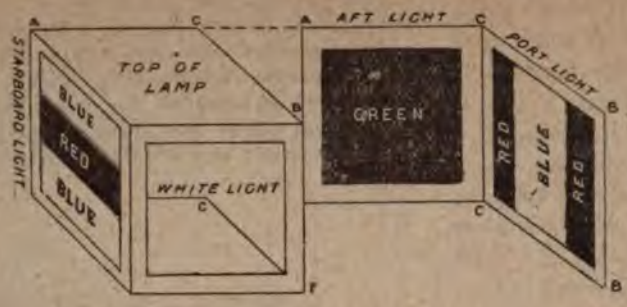
Being connected by a ball-and-socket joint, the valve is free to turn relative to the seat. This has two advantages, viz. :—In the first place the position of the valve is constantly changing relative to its seat, thereby tending to maintain the faces steam-tight, and in the second place the valve is easily repaired whilst the body is left in an undisturbed position on the line of pipes.



It will be noticed in the illustration that the valve is provided on its back with lugs, so arranged as to allow a small bar of iron to be inserted between them. To re-grind the valve in position a little fine emery or Turkey stone is spread over the face, and the valve is turned on its seat under the pressure due to the wedge-nut, by means of the iron bar, a perfectly steam-tight joint being thus easily made.

The indicating arrow in the diagram shows the

FIG. 3



SIDES OF LANTERN SHOWING LIGHTS.

FIG. 5.

TOPMAST. SHOWING LIGHT (PORT).

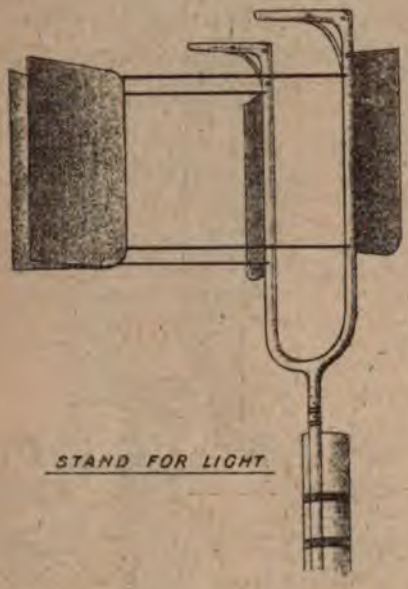


FIG. 4.

STAND FOR LIGHT.

FIGURE No 1.

FIGURE No 2.

NEW TOP-MAST LIGHT.

direction of travel of the steam, as the best condition for working, but it may be mentioned that the converse arrangement is quite workable. However, to ensure durability and other advantages it is preferable to have the steam forcing or tending to force the valve off its seat, the reason for which is obvious. By turning the wheel an eighth of a revolution, the valve backs off its seat 1-16 inch, the steam immediately passes all around the valve and not at the bottom only, as in other straight-way valves, and in this way the difficulties from local pitting are effectually got over, and the life of the valve is increased.

Another advantage is that no bye-pass is necessary in the large size of valve, while it is perhaps needless to point out the economy of straight valves over globe valves, as it has been proved over and over again that the former give a considerably higher efficiency over the latter, size for size.

We understand that the valves are made in several grades capable of use with steam pressures of 80, 160, and 250 lbs., and water pressure of 180, 750, and 1,200 lbs. per square inch respectively.

NEW TOP-MAST LIGHT.

CAPTAIN A. M. GALLET has been turning his attention to the minimising of the risk of collision at night between fishing vessels and large ships, and has devised a method of and means for exhibiting lights which he considers should meet the difficulties of the case.

He has found that England and Wales alone possess about 7,000 fishing boats, having tonnage of five tons and upwards, all of which carry their regulation lights generally fixed in the rigging at about 6 ft. above the railing.

The regulation lights, he contends, are placed too low to be properly seen, considering the height of large steamers and sailing ships out of the water, which is illustrated in Fig. 1 of the accompanying diagram.

Further, the existing arrangement of lights is outside the rigging, and should they be extinguished, it is quite possible that this fact may be unnoticed by the crew. Besides, in rough weather they are often very much wet by the sea. Of course, the salt sticking on the glass, diminishes the full view of the light.

Captain Gallet states that during his many years' experience at sea he has noticed that the men on the look-out on the forecastle usually look horizontally, or rather in a straight line, to the horizon, their eyes being full open; where, however, they have to look obliquely down, they necessarily lower their eyelids, which diminishes the full power of their sight. This is often a reason why fishing boats are not seen intime and are sunk by collision.

The suggestion is to suppress the actual side-lights, which are to be substituted by a special light to be fixed on the top of the mast, as shown in Fig. 5. In such a position the light will be easily seen, being at the same height as the man on the look-out on the large crossing ship—this is illustrated in Fig. 2.

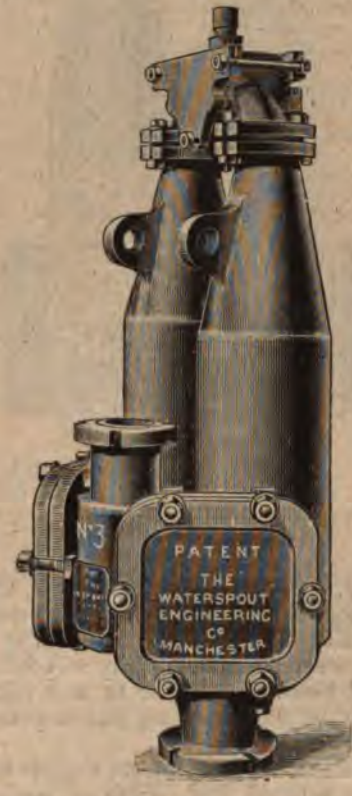
The special lantern proposed is square, and has its four sides illuminated, the forward side showing a full white light, the aft side a green light, the starboard side a horizontal red space between two horizontal blue spaces, and the port side a perpendicular blue space between two perpendicular red spaces.

The special shape of the suggested light prevents any confusion between the different colours on its faces, each one being quite independent of the others by a system of partitions made with the reflectors, and further has the important advantage of showing the course followed by the fishing boat.

Models of the device can be seen at the offices of Messrs. S. M. Frankenstein & Co., Dashwood House, 9, New Broad Street, E.C.

THE "WATERSPOUT" PULSATING STEAM PUMP.

THE class of pump operated by the direct pressure of the steam upon the surface of the water to be pumped and its alternating vacuum without the intervention of a piston, has long been recognised as having special advantages. The ease with which they can be got into position without special fixing and the large quantities of dirty water even mixed with débris they will lift, render them most useful in emergencies.



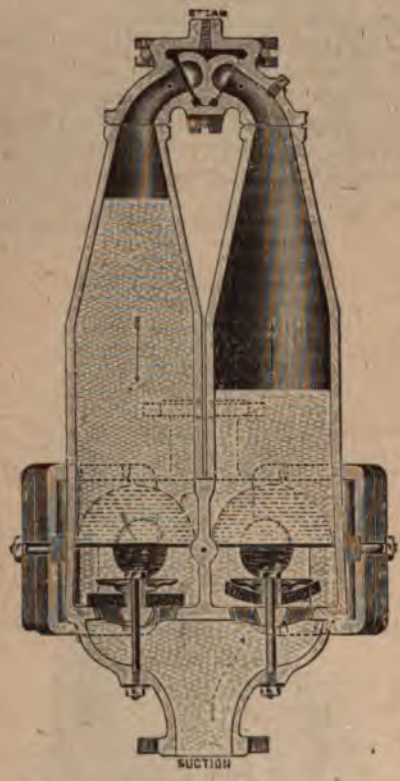
Such pumps are yearly being improved in the details of their construction to render them more efficient and more easily accessible for the examination or renewal of the delivery and suction valves.

The "Waterspout" Engineering Co., of 1, North Parade, Parsonage, Manchester, have designed and patented in Great Britain, the United States, the Continent and the Colonies, an improved form of

direct-acting pulsating pump, which they term the "Waterspout," and supply very high efficiencies at moderate prices. We have pleasure in giving sectional and outside illustrations of the pump, from which it will be seen that the pulsating or oscillating steam valve and seat upon which the efficient action of such a pump so largely depends, is of a novel form, the valve being formed of two hollow semi-spheres joined at their convex surfaces. The value of this arrangement lies in the fact that the seatings being flat can be easily filed or scraped up, and a large opening given with a small play of the valve.

Such a cheap and handy pump should be a great acquisition on board ship.

It is always ready to start, requiring no attention as to oiling or rusting, or as to packing of glands, and occupies little space, and with flexible steam and



water piping, can be shifted about at will, to any place and in any position, to deal with a sudden emergency, such as a fire or a sudden leak. The enormous quantity of water that the pump will deliver at low heads would make it superior to any other form of either rotary or reciprocating piston pump in such circumstances at sea.

It is less liable to failure than any other pump, as it will pass bits of coal, chips or grain, without choking, and would be most handy for sanitary purposes, emptying water ballast tanks or bilges, washing decks, filling the boilers after cleaning, and circulating water through condensers, and many similar purposes.

In raising wrecks and salvage purposes the facility for slinging this pump, without fixed attachments, should be very valuable.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

Milford.

THE meeting of this harbour company was really a lamentable occasion. If those who are interested here were all rich men, it would perhaps be amusing to the cynic to watch the developments, or rather the absence of them. The only thing that really develops at Milford seems to be unpaid arrears of interest. Yet one knows from one's own experience that there are many people with money sunk in these docks who are in great straits through the hopelessness of their affairs, and with them we cannot but be sympathetic. We can only, however, offer them the consolation of a proverb, namely, the saying that "The darkest hour is the one before dawn." Surely things are as dark as they can be at Milford. The dawn, if there is ever to be one for the present company, cannot be far off. Two things have occurred which show the desperate straits to which the concern is reduced. The first was the complaint of the way the Press was treating them. Imagine a live business, like the Southampton or the Mersey Docks and Harbour Board—both of which get sufficiently hard knocks from time to time, for none of us are perfect—turning round and complaining of the way in which they were spoken of, with a kind of veiled threat of retaliation in the comment that some of them were "libellous." Another, and equally painful sign of weakness, was the joy at the obtaining of an ally—and a railway ally. And who is the railway ally from which so much is expected? The Great Western? No. With some shrewdness the position of the Great Western towards them was dealt with by the remark that when they got an Atlantic line the Great Western might be approachable, but that till then it was not to be expected to do anything for them. The ally is no less a railway than the London, Chatham, and Dover. This company, so far as I am aware, does not run west of the Metropolitan area. Thus it does not come within as near a radius of their port as it does of either Liverpool or Southampton. The two concerns have the bond of being sufferers together from the misappreciation—in a financial point of view—of their qualities from an unkind world. But the Chatham think that Milford will be able to supply them with passengers from the Continent. One would have imagined that they might have got existing passengers from existing ports, without going after such shadowy children of the future. But if the Chatham is satisfied, all is well. Meanwhile Milford is contented. I wish, for the shareholders' sake, they had something less attenuated to feed on.

Perhaps we shall soon hear something definite as to this American line—not, of course, *the* American line—which is projected, if not the last hope of Milford, except, of course, the Chatham, would appear to be lost.

The Channel Islands Competition.

The Great Western Railway, with the short sea route to the Channel Islands, has now three very fine twin-screw boats in its daylight service. These comprise the *Ibex*—till a very short time ago their finest and newest vessel—and the *Reindeer* and *Roebuck*, recently built for them by the Barrow Company. One of these new boats was at the Naval Review at Spithead, and very well she looked there, though her two red funnels may be a trifle too close together for a very critical eye.

The model of these new vessels is now on view on the departure platform at Paddington. I have had occasion to visit the station several times lately, and have on each occasion found the case containing it surrounded by a large and interested crowd, who have been studying every detail. This is a capital way of making known the class of facility the company offers to Channel passengers, for a vast number of the general public use Paddington.

Deep Sea Diving.

In April, 1891, something came in contact with the hull of the steamship *Skyro*, bound from Cartagena to London, when off Cape Finisterre, and 20 minutes after the contact she went down in deep water. It was alleged that she had been struck by a live torpedo, and much ink was spilled in consequence, for naval men took the incident in its bearing as regards the power of such missiles, and mercantile people did not care about having a supposed new risk for their property. But it turned out after all that it was not a torpedo, or anything like one; the vessel had merely passed over Mexiddo Reef, but that was

enough for her, and she sank in deep water. The depth was so great that it was at first concluded that ship and cargo were gone for ever. But the cargo was valuable. It comprised about £9,000 worth of silver and a large quantity of lead. It was, therefore, worth considering if the cargo at least could not be recovered. Mr. J. K. Moffat, of Bilboa, under arrangements with Lloyd's, undertook the business. It was not, however, till last year that any success attended the work. During the season about two-thirds of the silver and some of the lead was got up. This year the work has been completed—as far, at least, as the treasure is concerned. Several divers were employed on the work, but one of them, Angel Erostarbe, brought up all the silver. The vessel had to be attacked with dynamite before the work could be completed, and when she was finally left the divers reported that, save where the engines and boilers were, the vessel was reduced to a heap of old iron, nowhere exceeding the height of a man. The work of the divers can be in some way gauged by the fact that the pressure at which the work was carried on was as much as 72 lbs. to the square inch. It was only owing to the perfect installation of extra strong plant, made by Messrs. Siebe, Gorman & Co., that the work was possible. The depth at which the exploit was achieved seems, for the present, to hold the record, as it beats the famous salvage of the *Alphonse XII.'s* gold by nearly three fathoms.

The Isle of Man Traffic.

The further opposition to the Isle of Man Steam Packet Company (which, as I remarked some months ago, was sure to follow their action in settling the opposition which threatened them at the beginning of the season), is already taking shape. It was hardly to be expected that it would be otherwise, since the season of 1897 has been a record one, and those who wish to have a finger in the Manx pie are given notice, almost in so many words, that they may get some return for their trouble without having to get seriously to work, or to endure an anxious period of working at a loss, while rates are cut far below any hope of remuneration. This time the new company is styled the "Isle of Man Palace Steamers, Limited." The names connected with it are not familiar to me. They all hail from addresses in London or the suburbs. The amount of capital is not very ambitious—a sum of £10,000 in all. It would hardly seem that with such a capital vessels, or even one vessel, of a character which could compete successfully in either speed or comfort with the really fine vessels of the old line. The *Empress Queen* seems to be one of the finest, if not actually the finest, excursion steamer afloat in British waters, and there are several vessels in the fleet which are quite worthy to be in her company. It will be interesting to see how things develop.

I see that a suggestion is made that vessels of the type quite recently built for the Channel Islands daylight service of the Great Western Railway be constructed for this new Isle of Man company. With this view power has been taken to increase the capital to £150,000. The vessels would, it is said, be ready to commence work by the beginning of next season.

The Tapscott Line.

The affairs of this company having been a good deal before the public recently, it may be well to give a note on the fleet. The present business was started about 1877, and the first vessel was one of 2,000 tons gross, launched in 1879. Others followed rapidly. Up to last autumn there had been altogether 13 fine steamers under the management of the firm. At that time eight were still in the fleet. Of these, one—the *Alderley*—belonged to the Tapscott Steamship Company, Limited, and the other seven to single-ship companies, of which the firm was manager. Four of them were fitted for carrying petroleum in bulk. There was in these eight vessels some 22,952 tons of the most modern shipping, the vessels only averaging 5¼ years each. They were all fitted with triple-expansion engines, all built to Lloyd's highest class, except one or two of the tankers, which were classed by the Bureau Veritas, and all, without exception, were turned out from yards of the highest reputation on the North-East coast.

I may add that the firm was also managers to a company called the Manchester Traders, Limited, which owned the *Telegraphic*, formerly a vessel of the Belfast Steamship Company's fleet. She was an inconsiderable vessel, being of great age and of small tonnage, but she was only intended for the coasting trade, and no doubt was fairly well fitted for the purpose for which she was used.

The London and New York Cabin Traffic.

It is not long since we heard that the diminution in the receipts of the great Atlantic lines was not shared by the cargo steamers, which carry cabin passengers only, out of the port of London. These lines are not long to be left in undisturbed enjoyment of the trade. Already the new combination of the Wilson, Furness, and Leyland Lines has laid its plans to capture the new ground. Two vessels out of five for the line are already put in the water; the remainder will shortly follow, and all are to be at work by the commencement of the 1898 season. They are certainly of great size. Their cabin accommodation is limited to 125, all of the one class; but, though the accommodation may be good, the vessels themselves are, as far as I can learn, in every way inferior to those of the Atlantic Transport Co. How they may compare in speed remains to be seen; but, after the experience of the large cargo boats recently built for the Atlantic services, and the frequent breakdowns they have experienced, they will be brave—or ignorant—passengers indeed who will risk themselves in big single-screw cargo vessels—unless, possibly, time is no object to them, and they do not mind the chance of a prolongation of the voyage.

Publications.

From the London and North-Western Railway I have received two publications, both copiously illustrated with reproductions of photographs taken by the well-known artists, Messrs. Walery. One of them deals with the company's service to Greenore. It shows the kind of scenery to be visited in the North of Ireland, and the facilities which the North-Western offers for the tourist to that part of the Emerald Isle. Now that public attention has been so largely called to the beauties of Ireland by the accounts of the correspondents who accompanied the Royal party in their Irish tour, there should be a rush of passengers across the Channel, and Ireland should get some of the excursion expenditure which has so long been lavished upon the Scotch and Welsh.

The company now has two very fine and quite new boats on the Greenore service. They are the *Rostrevor* and the *Connemara*, and they are both fitted with twin screws and every modern appliance for comfort and safety.

The land journey is made easy enough by the new trains which are being put on by the company. These are illustrated in the second pamphlet which I received. For first-class passengers there is every luxury in the way of sleeping carriages, by the night mails. But the wants of the less wealthy of their customers are not forgotten. There are lavatory carriages for all classes; breakfast, luncheon, and dining cars are also run—a great extension of the refreshment car department, as far as third-class passengees are concerned, having been instituted on the 1st September. On the whole it may be said that now-a-days a North-Western train (to paraphrase Dr. Johnson) offers the comforts of a steamer without the chance of being seasick.

Pacific Steamers.

It is not often that the London correspondent of the *Glasgow Herald* is caught tripping, but a very-much-copied paragraph from his pen is certainly founded on a confusion. He speaks of the Pacific Mail Company as "if not actually founded by the late Sir William Pearce, being at least one of his creations." He then speake of the unsuccessful effort which was made at the time the *Paris* and *New York* were put on the American register to put on the Fairfield-built *China* also. He refers to the fleet which carries out the company's numerous services, and goes on to say that "with one or two exceptions, it is composed of old Cunarders." Now he has got in considerable difficulties here. The Pacific Mail Company may to some extent have been indebted at the start to the late Sir William Pearce, for the Fairfield firm engined several of the earlier boats built for the line; but the hulls of all the vessels which have passed through it s lists have, with one exception, been built in the States. Tha t exception is not "an old Cunarder," but a vessel which belonged to the East Coast, and was wrecked in American waters. She was condemned, but got off by an American wrecking company, repaired at great expense, and so put on the United States registry. The American law has always allowed vessels on which sufficiently expensive repairs have been executed in the States to be put on their register, even if they were foreign built. All this does not affect the probability of the story he has to tell about the *China* herself. That is, that she is to be put on the Hawaian Register, because it is believed that the

country is about to be annexed by the States, and that thus she would get into the American Register when the other merchant vessels of the Islands were admitted or taken over. There is no doubt, as evidenced by their former and unsuccessful attempt, that her owners want to get the *China* nationalised. And this looks a likely way to do it. Its smartness and indirectness, too, are quite worthy of Yankee cuteness in circumventing the law.

The company with which the Fairfield yard has so close a connection is not the Pacific Mail Line, but the Northern Pacific Company, a quite distinct undertaking. Nor does the *China* belong to the Pacific Company. Being British-built, an American company could not own her. She is separately owned by an English company, with a London office. This company owns another vessel, at least, as well as the *China*.

The Indian Trooping Season

has already commenced. There are again four merchant vessels employed. The P. & O. Company still have a pair in the business, but the *Britannia* and *Victoria* are there no longer, the *Nubia* and *Simla*, two of the three sisters recently built for the Calcutta service, having replaced them. The object of this change will probably be found to be a desire to have all their largest and fastest mail steamers ready for employment under the new contract in the accelerated service to the Australian ports and to Bombay.

Speaking of the P. & O. Company reminds me that Captain Almond, one of their senior commanders, died at the end of August. It is some time since he had a command, his work of recent years having been ashore.

The New Atlantic Liners.

M. Mallet has contributed to the "Bulletin de la Societe des Ingenieurs Civils de France," a very interesting paper on the huge new vessels which have recently been added to the fleets of the mail lines, as well as those which are still preparing for the competition. He gives a table which contains six ships. The *Great Eastern* comes first, for historical purposes, and because, even now, she is the biggest vessel ever constructed within historic times. Then comes the *Campania*, of the Cunard Line, the two North-German Lloyd boats from the two German yards, and the *Oceanic*, now building at Belfast, for the White Star Line. Last of all comes the *Pennsylvania*, of the Hamburg-American Line, also built at Belfast. She, of course, is only a cargo-boat, but her size gives her the *entrée* into this select circle. It will be noticed that her speed is given as half a knot better than the *Great Eastern's*, and her power as 500 I.H.P. less.

I have not given all the dimensions in the feet and inches columns as a translation from M. Mallet's metres, for I found that, according to my tables, he had some little variations from what I believe to be exact; some of the depths he gives must be calculated to the upper decks. I have, therefore, filled in the dimensions as given in Lloyd's register, as far as such figures are available. I may add, it is a mistake to give the *Kaiser Frederich der Grosse* to the Hamburg Line. She, with the other "Great Emperor," is for the North-German Lloyd Company.

Name of Ship.	Length.		Beam.		Depth.		Tons. Displacement.	I.H.P.	Speed on Trial in knots.
	In Metres.	In Feet.	In Metres.	In Feet.	In Metres.	In Feet.			
Great Eastern	207·5	679 6	22·5	82·8	17 7	31·6	31,000	6,000	14·0
Campania	189·7	601·0	19·9	65·2	12·7	37·8	18,000	30,000	22·0
Kaiser Wilhelm der Grosse ...	197·9	625·0	20·1	66·0	13·1	43 0	20,500	28,000	—
Kaiser Frederich der Grosse ...	182·7	609·0	19·5	63 10	12·5	37·0	17,000	—	—
Oceania	214·7	703·6	20 5	67·4	15·2	50·8	25,000	40,000	—
Pennsylvania	196·8	560·0	18·9	62·0	12 8	41·0	23,500	5,500	14·5

A Broken Shaft.

The experience of the Anchor Liner *Circassia*, which has just arrived in safety at Queenstown after a protracted voyage, owing to the fracture of the after end of her shaft, is one which should impress upon steamship owners the inadvisability of the single screw for passenger vessels. She was eastward bound, and had been seven days at sea when the accident happened. They had got, it appears, to about lat. 36 deg. west. It was found that the vessel was unable to make headway to any valuable extent under sail alone. After thirty hours a Danish steamer came along. She towed the disabled ship some eighty miles and then left her. Then for nine days nothing, that was able at least to aid her, was sighted. At last came up Messrs. Elder, Dempster & Co.'s big steamer *Memnon*, bound for Avonmouth, out of which port she is working for the Dominion Line. She was, of course, just the steamer for the job, and she brought the *Circassia* some 660 miles into safety. It is well to avoid comment on a matter which may have hereafter to be adjudicated upon. But the fact remains that the vessel was twenty days on her voyage, a thing which, though it occurred through no fault of those connected with the ship, was calculated to cause passengers great annoyance. It must also be expensive to owners, and when we regard the comparative frequency of these breakdowns, it cannot but be regretted, from the point of view of every interest concerned, that so many important steamers are still being turned out with single screws.

Deaths.

One of the oldest shipowners in the country passed away on the 1st of September, in the person of Mr. James Anderson, of the firm of Anderson, Anderson & Co., one of the two houses which manage the affairs of the Orient Line. He had attained the ripe age of eighty-seven, and had a business experience of no less than sixty-one years. This extended from 1828 to 1889, but the last eight years of his life were passed in retirement. He has, of course, seen enormous changes in the methods of transacting business in every department, especially in the shipping trade, and his own firm had altered very considerably even in name. For when he joined it it was known as James Thomson & Co., its present style not being adopted till 1870. It was about nineteen years ago that the Orient Company was formed.

The sensational loss of the Compagnie Generale's steamer *Ville De St. Nazaire* will be fresh in the minds of those who are interested in the Fleets of the Mail Lines. The gallant behaviour of Captain Nicolai on that occasion will not, therefore, be forgotten, and the announcement that he died on the 31st August will be received with regret. He had been appointed to the company's steamer *Fournel*, and it was on board of that vessel that he succumbed to an attack of fever. He was buried at sea.

The Castle Mail Packet Company

are determined to keep their fleet in a condition worthy of the reputation for care and efficiency which they have so long enjoyed. The *Dunnottar Castle*, a vessel of modern date and type, has already been thought by her owners to be due for an overhaul, and, accordingly, she was taken off the station on her return from her twenty-ninth trip in April of the present year and sent round to the Clyde. It seems only the other day since we heard of her trials, and of the cruise she took with a party of Sir Donald Currie's friends round the coasts of Scotland to visit the old ruined castle from which she takes her name. And

already she has travelled a distance—when we remember that the voyage she goes is from London to Port Natal, and not merely from Southampton to Capetown—of something over three hundred and fifty thousand miles. The vessel, which in 1891 was considered too big for the Cape trade, has been surpassed in size, though not perhaps in popularity with passengers, by her younger sisters, the *Tantallon Castle* and *Dunvegan Castle*. Another mail boat even larger than these is building for the line, so that every means which prudence and foresight can suggest is being taken to provide for the expansion of the Cape trade, and for the convenience of travellers by the Castle Line.

The most striking alteration in the vessel's appearance is produced by the fact that the yards have been stripped from her foremast as useless, and even troublesome, and so she appears as a three-masted schooner without any yards at all. The removal has not detracted from her beauty, though a larger and better protected crow's nest has been placed high up upon the foremast. A little closer inspection shows that the number of deck-houses has been increased. This is really the point for which saloon passengers have most reason to be thankful. The old smoke-room in the poop has been converted to other purposes and an entirely new house built on the promenade deck for the accommodation of smokers. It contains a commodious smoke-room and a little bar. There is a lofty omnibus roof with newly designed windows of large area and square shape, which give much light and ventilation with perfect security against any risk of discomfort from spray or chance seas in heavy weather. Up here, too, there are new deck state-rooms, some of them built to accommodate only one passenger apiece. Then the state-rooms below, both in the chief saloon and intermediate classes, have been largely re-arranged and improved. Some of them have been increased in size and indeed space and ventilation are characteristics of the vessel, as well in the living part of the ship as in the machinery department. Very superior accommodation has been provided for the stewards, who certainly deserve, and, no doubt, appreciate the thought which is on this line bestowed upon them. The forecastle has been brought back further into the forward waist and thus larger space has been given to the crew's quarters, whilst there is better protection from spray for the third-class passengers, who sit and walk in this waist, when the vessel is steaming fast against the trades. A noticeable feature in this line is the provision of large quantities of garden seats, of a very comfortable and identical pattern, on the decks reserved for every class of passenger.

At the other end of the ship we see that entirely new steering-gear has been provided, the *Dunnottor Castle* now being furnished with the absolutely noiseless appliances found on board her most recent sisters. She is now steered by Brown's telemotor. A powerful reserve screw hand-gear is contained in the after wheel-house. But the steam steering gear is actuated by wheels, placed both on the bridge—whence, of course, she is usually steered—or from the top of the after wheel-house. The saloons have all been re-decorated and re-upholstered. The prevailing note is repose and light. In the saloon this is attained by the use of white paint and ivory enamel, lightened up by red morocco coverings for the seats. The panelling here is maple set in mahogany frames. The smoke-room is panelled in oak. The rejuvenated vessel was appointed to sail from Southampton with the mail of the 18th September. I had the pleasure of going down Channel in her. She was to leave her berth in the docks at a little before five o'clock on Friday morning, and to avoid the inconvenience of a night transit of the docks, the company's guests were told to be aboard the previous evening, and a very pleasant evening was spent, as there was both professional and amateur talent on board. Some stirring personal reminicences of campaigning in little wars where history was made were recounted in the smoke-room. On Friday we were running down Channel all day, with a bright sun and a fresh breeze. It was just the occasion to show a trip of this kind to its best advantage. It always seems to me that the course down Channel is a peculiarly interesting one, for the road lies so close to the shore that one has a continual interest in looking at the various watering places which flash past almost like stations on a suburban railway. Then both the outward and inward tracks lie so close together that one sees to advantage everything nautical that one meets. In that respect we were fortunate, for we saw many fine specimens of the Mercantile Marine. The P. & O. *Arcadia* was the first. She looked, as she is, a very fine representative of the great eastern fleet. She looked far better on the sunlit water than she did when last I saw her, completing for sea in the dock at Queen's Island. Then came another Belfast-built vessel of a very different appearance, though in her own line most efficient type. This was the Harrison liner *Historian*. Another big Liverpool liner was the *Haddon Hall*. She is a big and almost new Tyne-built vessel turned out by Palmers' within the last two years. Then up Channel came a fine passenger boat whose identity baffled everyone. She had four masts and one big funnel, painted black, with the familiar white band round it. One felt that she was an Inman liner, and yet remembered that the Inman line is gone, and that the relics of the fleet, not only did not fill the description but were otherwise accounted for. It was not till I got home that I found her out. She was the Red Star Liner *Friesland*, bound to Antwerp from New York. The old funnel will not soon be forgotten if it is to be carried by Red Star liners as well as by the American Line fleet.

So we ran down to Netley, whilst those who were strange to the line were entertained by the numerous games with which the possible tedium of a Cape voyage may be averted. Then, too, there was the interest and excitement of watching boat and fire drill. Boat drill is especially interesting to the spectator on a Castle Liner because the boats are not carried in an unattainable position but are placed on the rail, all ready to be swung out and lowered into the water.

On Saturday morning a reluctant good-bye was paid to the ship as she lay alongside the Empress dock extension at Southampton, waiting for the remainder of her passengers—and Her Majesty's mails. Her popularity with regular travellers was attested by the fact that she leaves Southampton with a full list in both saloon and intermediate cabins.

The New Atlantic Flyer.

One cannot help being sorry for the owners (and agents) of the *Kaiser Wilhelm Der Grosse* in the delays and disappointments which attended the start of their fine new ship. Such delays, of course, occur in every new ship. But they are not always brought so prominently before the public as they have been in the present case. The fact is that she was kept too long at Stettin. Long was she advertised as to make her maiden effort for the Southampton record by taking the outward sailing of September 15th. This is, of course, a very busy time in the westward passenger trade, and berths were very freely booked. In fact, I believe, the vessel was pretty well full early in the month. But she did not leave the Vulcan Yard till August 29th. She had a run of about 600 miles to perform before reaching the Weser, and thus she gave fair opportunity of showing her paces. Here, it is understood, that she gave every satisfaction. But unfortunately early in her progress she stranded in the Kaiserfahrt. Immediately an unfounded, and apparently malicious, telegram (which is believed to have emanated from Hamburg), reported that she was ashore and leaky. This was, of course, quite untrue, as she lay on the mud. But it was not till September 7th that she was floated, and even then she did not reach her berth. Thus it followed that the preparations for her departure were very much hurried, and that in point of fact it was not till the small hours of the 21st that she really set her bows for the westward run. On the 20th I had the opportunity of going down by the passengers' special, and having a look at her. The start was an early one, and the train was heavy, for a large number of London passengers were booked by her. We reached Southampton soon after eleven in the morning. Here we were greeted with the intelligence that she had passed the Weser Lightship at 7.10 the previous evening. This looked like a very long spell of aimless wandering round the town and docks, and a fear that perhaps she might come up after sundown. But a little later came the news that she had passed Dover at 9 a.m. This set people to work at various calculations with pencil and paper, and it soon appeared that she was showing her paces to some purpose. It was next announced that the tender would go out to her at 2.30. This arrangement was adhered to, and I may remark that the big ship was said to have passed Ryde at 2.20 p.m., having thus run from the Weser Light in 19 hours and 10 minutes. This feat is distinctly a record, and it was added, though on what authority I know not, that it was done with some 5,000 I.H.P. less than her maximum.

As the tender got down to Netley the four funnels appeared broad upon our starboard bow and very soon the big ship dashed up, passed us, and anchored off the hospital. We struggled alongside. An interminable time seemed to be consumed in

making fast and getting a gangway rigged. Meanwhile there was a tremendous amount of cheering, band-playing and waving of handkerchiefs. The wait gave one an opportunity of looking at the ship's outward appearance. The four funnels look well, though, of course, being four, they are smaller individually than those of the *Teutonic* or *Campania*. In point of fact their diameter is 12 ft. 6 in. The masts are, of course inconsiderable, and are not intended for anything but signal poles and supports for lights and a crow's nest.

The vessel has a straight bow with a long forecastle with a couple of breakwaters upon it. Then comes the waist and aft of that the front of the promenade deck. In the round-faced deck house is, as I found later on, the writing-room, and above that, chart houses, captain's room, and the main bridge of the ship. I say main bridge, because there are two others, one amidship between two centre funnels and another away aft. The line of deckhouses on the promenade deck is a very long one and above the whole range is carried a boat deck. The measurements, of course, are not yet available. But as there are ten boats on the davits on each side the length covered must considerably exceed 300 ft. The saloon accommodation is naturally amidships and the second-class passengers are berthed aft, having a fine promenade on the poop. One noticed too that there are alley ways inside the deck houses on the spar deck amidships, though for the greater part of the ship's length there is the open rail characteristic of the "oceanic-type" of ship. One saw, as one may here, that the butts of the plates are scarfed, that the rudder is entirely under water, but that the hull above it, in the neighbourhood of the water line, is curved in rudder shape, as in the case of the *Paris* and *New York*. She was drawing at this time between 27 and 28 ft. of water aft. So we got on board and were told that only a stay of half an hour could be relied on. A rush was first made for the saloon. Here the usual practice of the line has been followed in the fact that the staircase goes right in to the apartment and is not shut off from it by doors. The arrangement of the saloon is unique. For there may be said to be five saloons. That is to say, the main saloon extends the whole breadth of the ship. But in the fore and aft bulkhead at each corner there are doors sliding back into the wall and only to be closed for drill, or for emergency. These lead each into a little saloon capable of accommodating a score or so of passengers. The decoration of each of these rooms vary. All is tasteful, but of course very continental in style. The idea of this arrangement of saloon is a very good one. For it gives a certain degree of privacy to these who desire it, and at the same time it prevents any danger there might be of cutting at the bulkheads at this high level to allow of a single saloon being built, capable of seating so large a number of persons. The central shaft leading up to the skylight is not such an excessively large one as we have seen in some ships. But it is well-decorated. The arrangement here is that of the *Teutonic*, the dome, as viewed from below, is lined with stained glass. But this is backed by thick plate which forms a wide expanse of table land in the centre of the social hall above. That again has its skylight ending in at the level of the boat deck.

The smoke-room is a very handsome apartment on the upper deck. It is the full width of the deck-house, and is horse-shoe shape. This is because the casing of one of the funnels runs through it. No doubt efficient means have been taken to prevent undue heat, and the effect is good as the points of the horse-shoe become comparatively quiet, whilst one sitting back at the centre of the outer circumference could see and be seen by the whole room if an auction pool were in course of proceeding. The decoration of this room is in stamped leather. Some of the panels are coloured and represent sea scenes.

The ladies' apartments are very handsome.

There are a large number of suites of rooms. These adjoin the shaft of the main saloon. They comprise sitting-room, bedroom and bathroom. The baths are very complete, whilst the wash-hand stands are marble with lift-up basins as ashore, and the beds in some cases are of the ordinary brass hotel type. The sitting-rooms contain writing-tables and every convenience.

In the ordinary staterooms the bunks are of iron. But the outer rail is covered with a sort of Axminster carpet. This may take away the chilly feeling, which may be an objection to the cold iron for delicate women, but it cannot be as cleanly. Most of the better cabins have little wardrobes or drawers, and the other usual appliances are fixed.

My visit to the engine-room was of the briefest, and as all was bustle, there was little chance of asking questions. But it is noticeable that the middle line bulkhead is carried high and along the top runs in a closed-in alleyway for passengers and stewards fore and aft. Thus each engine-room is absolutely distinct, and one can only look down on a single set of machinery from above. The middle line bulkhead has very small doors for working purposes, and means are taken to insure their rapid closing in case of emergency. I may add here that she has 16 transverse bulkheads. What struck me most about the engines was the exceeding lightness of the columns. They are, I believe, of best steel, and are on a pattern which has succeeded in certain recent German ships. Each engine-room has four boiler feed pumps at its forward end. The usual appliances for maintaining a pure feed and economising heat are present. The electric light engines are situated aft of the engine-room between the screw shafts. Auxiliary engines are provided for starting and for turning over the main engines in port.

I can add little more of a useful kind at present. By next month it is hoped that full and illustrated details will be available. But I think what has been said, though it is of a very general character, will show that she is a ship of which builders and owners may be proud. Her sea performance will certainly be watched with the greatest interest.

Funnels.

The MARINE ENGINEER does not yet set up to be a comic paper, but I heard a yarn aboard the *Dunottar Castle* which was so very appropriate that I must be forgiven for telling it. A mixed party discussing steamers, got on to the question of machinery, and some doubt was expressed as to whether the *City of Rome* had compound or triple-expansion engines. A lady of some experience as a traveller was present, and she cut in with the decisive remark that she knew. She had crossed by her. "The vessel has triple-expansion engines, of course," adding (to her husband) "Why, don't *you* remember, my dear, that she had three funnels."

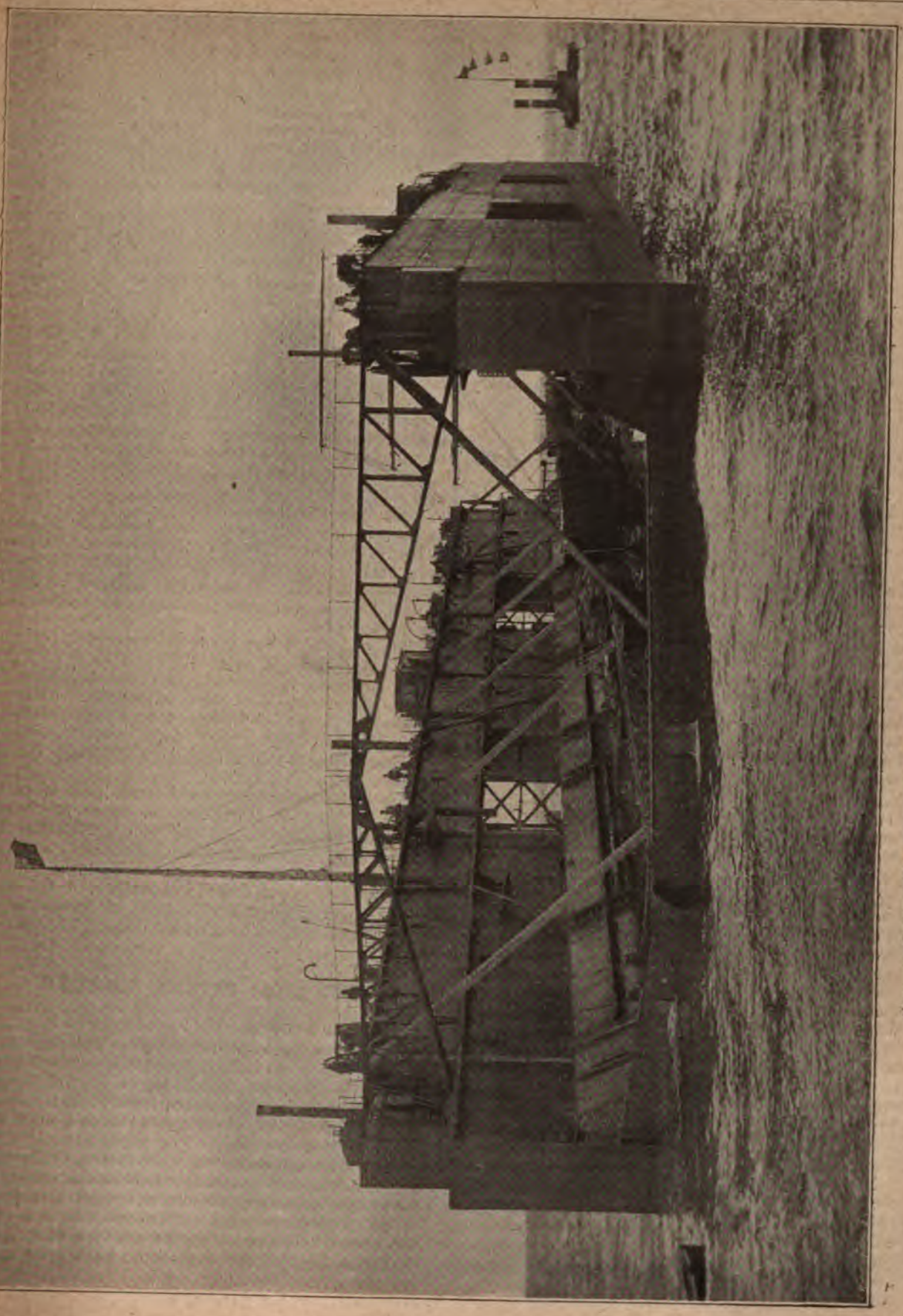
In view of the importance which some people seem to attach to the funnelling of steamers perhaps the lady is not alone in her ideas as to their functions.

The Dock Question.

The great increase of recent years in the tonnage of steamers has caused a proportionate activity amongst those who have to provide facilities for the discharge and repair of vessels. Competition is so keen that every process must be accomplished with the greatest rapidity, for time means money, and delay means loss of earnings. So the dock people all over the country are beginning to wake up. Glasgow has just had its fete over the Duke and Duchess of York's visit to the city, and over the ceremonies performed at the Cessnock Dock, which now takes a new name in honour of its royal sponsors. Bristol, too, is beginning to awake in view of the fact that the Elder Dempster boats, which visit its port under the Dominion flag, are growing in size with startling rapidity. It is to be hoped that they will do something at once, for the *Memnon*, being delayed through her services to the *Circassia*, as noted elsewhere, could not dock in the then state of the tides, though her draught was only 22 ft. This means delay and expense to the owners, and tends to give a port a bad name. The Bristol people should remember that ships are built more quickly than steamers, and that, therefore, their facilities should be somewhat ahead of the requirements of the day, certainly not a long way behind them. And that they are at present—for *Memnon* is by no means a large vessel. She is only 3,100 tons gross register, and her length is under 350 ft.

FLOATING GRAVING DOCK.

THE Floating Graving Dock, of which we give a page illustration, was built to the order of the Spanish Colonial Office for use in the Island of Cuba at the Port of Havana. Convenience for docking ships of all classes, particularly ships of war, has been rendered absolutely necessary since the recent insurrection in the island of Cuba, the Spanish Government having to maintain a somewhat large fleet in the waters of the Gulf of Mexico, and it being



Floating Graving Dock built by Messrs. C. S. Swan & Hunter, Limited, Wallsend-on-Tyne.

absolutely necessary to dock, clean and paint these vessels at regular intervals. The Government therefore, under a royal decree issued last year, invited British and Continental shipbuilders to tender for the construction of a suitable dock, and after a close competition on the part of some of the largest constructors in the world the tender of C. S. Swan & Hunter, Limited, based upon the designs specially prepared by Messrs. Clark & Standfield, of Westminster, was accepted.

The type of floating dock accepted by the Spanish authorities is the latest improvement in this class of structure as designed by Messrs. Clark & Standfield. It consists of three portions :—

1. The pontoons or body of the dock which afford the required buoyancy.

2. The high sides or walls which regulate the descent of the pontoons below the water and also afford the necessary stability.

3. The moveable caissons or gates that are only used when it is required to increase the lifting power of the dock.

The length overall of the dock is 450 ft., the clear width between Broad altars 82 ft., the depth over the sill 27 ft. 6 in., the draught of water under these conditions being 42 ft. 6 in., and the freeboard 4. ft. 2 in.

The pontoons are five in number, the three middle ones being rectangular in shape and the two end ones, being finished off in the form of a point. The width of all the pontoons is 87 ft. 1½ in., the length of the rectangular ones is 75 ft., and that of the pointed ones 108 ft. 4 in. There is a space of 2 ft. between each pontoon. They are separate from, and lie wholly between the two walls, to which they are strongly bolted. The extreme breadth of the dock is 109 ft.

The dock is constructed throughout of mild steel of the quality usually employed for shipbuilding purposes. Each pontoon is divided into four watertight compartments, and each wall is divided below the engine deck into five watertight compartments so that the entire structure is divided into not less than 30 absolutely watertight spaces. Each of these compartments can be emptied of water by means of an electrical pumping installation. This consists of two generating plants, one in each wall, but with connecting cables so that either can serve the whole dock. Each plant is complete with boiler, engine, and direct coupled dynamo. The power is transmitted by cables, having their switches and resistances located in the valve houses, to ten electric motors, five in each wall. These motors are vertical and drive direct on to the shafts of the horizontal centrifugal pumps placed in the bottom of the walls. The pumping machinery is capable of lifting an ironclad of 10,000 tons weight in 2½ hours, which means that 15,000 tons of water must pass through the pumps before the process of lifting is complete. The whole of the electrical machinery has been supplied by Messrs. Scott & Mountain, of Newcastle, and it includes a complete system of electric lighting throughout the dock.

In order to render the dock efficient and suitable for lifting short heavy vessels such as ironclads, a caisson is fitted at either end of the dock. These caissons are so adapted as to be adjustable to various lengths of vessels, the greatest distance being 383 ft., and the smallest 350 ft., these lengths representing the longest and shortest armour vessels of the Spanish navy.

Another important feature in this dock is the arrangement by which any portion of it can be examined, repaired, cleaned and painted. Each pontoon can in turn be detached, lifted and hung up on the side walls, and there any necessary work can be executed. The underneath portion of the walls being exposed for cleaning and painting by careening the structure. The dock is thus what is now termed self-docking.

The time occupied in building the dock has been exceedingly short, the contract having been signed in December last, the material ordered at the end of December, and the first plate laid on the blocks on the 27th February. The builders only took possession of the premises on which the dock has been constructed on the 1st of January, and it was then necessary to prepare machinery and lay out the yard in a manner suitable for carrying on this new class of work. The time occupied from the date when the first plate was laid on the blocks to the date of launching is exactly six months. The construction of an ordinary graving dock of similar capacity would have occupied at least two years, and would probably have cost four times the money.

This dock was towed out to Cuba by means of the large and powerful cargo and passenger steamer *Ruapehu*, one of the fleet of the New Zealand Shipping Co., which vessel has been specially chartered for the purpose. A smaller steamer was engaged for assisting in steering and acting generally as a consort to the larger vessel.

The dock itself was manned by a captain, officers, engineers and crew, accommodation for whom was provided in one of the walls of the dock above the engine deck. The dock itself is provided with a fore mast and square sails together with a jigger mast aft, and has steam steering gear, steam windlass, anchors. cables, and every minor appliance necessary for the voyage.

The dock was launched on August 28th from the Pontoon Yard of Messrs. C. S. Swan & Hunter, Limited, of Wallsend, and has been built under the supervision of Mr. Enrique Gadea, of Paris, the engineer specially appointed by the Spanish Colonial Office, of Mr. Lyonel Clark, the designer of the dock, and of Mr. Andrew Trotter Lynn, of Newcastle-on-Tyne, who has acted as resident inspector under Mr. Gadea.

EDWARDS' PATENT AIR-PUMP.

WE have lately had the opportunity of inspecting a new type of air-pump for use with condensing engines, which has been invented and patented by Mr. Frederick Edwards, M.I.N.A., of 62, Bishopsgate Street Within, London, and of witnessing a most interesting series of experiments carried out with models of this air-pump.

We were much struck with the extremely ingenious methods adopted by Mr. Edwards in the conduct of his investigations and the clever inductive reasoning by which he deduces his conclusions. It is a somewhat remarkable fact that the old type of air-pump in use at the present day should have been manu-

factured for so many years, and is still to-day of a design which does not coincide in any practical degree with the recognised theories relating to the design of air-pumping machines, when one bears in mind that the main and essential function of such an air-pump for a surface condensing engine is the removal of air, while the removal of the water, resulting from the condensed steam is quite a secondary feature.

The form of pump now generally used with condensing engines was originally designed for raising water for general purposes from one level to another by what is generally known as suction, *i.e.*, by reducing the pressure in the pump barrel, and allowing the

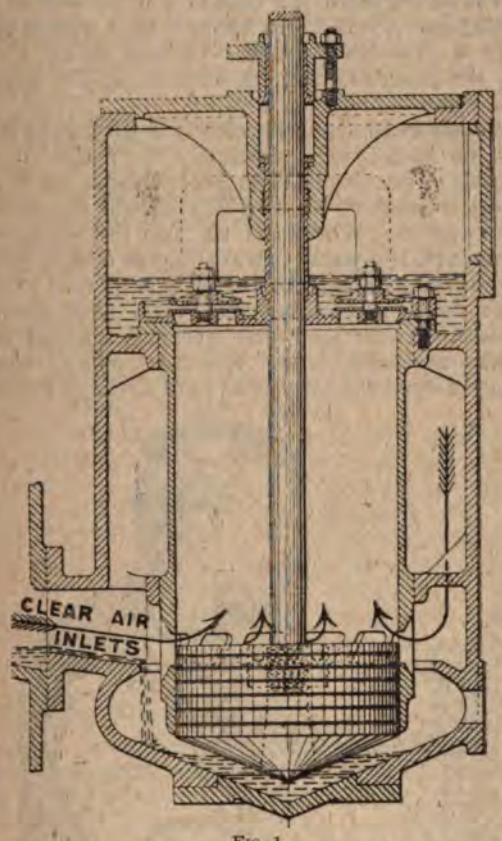


Fig. 1.

pressure of the atmosphere to drive the water up into the pump. The depth from which it is capable of drawing water depends, therefore, on the pressure or weight of the atmosphere, and in a similar way the air-pump of a condensing engine works, the foot valves being lifted and the water being driven up into the pump by pressure; but in this case not of the atmosphere but that of the condenser, which must be sufficiently above that of the pump to lift the valves and drive the water up through them. The pressure required to lift the water is, generally speaking, small and less than that due to the height of the column as water, because the effective height of the water is reduced by the volumes of air bubbles in it. The fact of pressure being necessary shows clearly a radical defect, as the object to be gained is to get as near equality of pressure between the pump and the condenser. Further than this, the air has to find its way up through the water and valves the best way it can; and the valves, in order to ensure their closing quickly enough also to prevent wear and tear and breakdown, invariably have a very small lift, the area being thereby much contracted. In nearly every pump the effective area through the valves, owing to the small lift, is so reduced that it is at most only 50 per cent. of that through the seat, and in some it is only 20 per cent.

In the ordinary type of pump the water traps and locks the air out, similarly to the locking back of sewer gas in a drain, but with this difference—in a drain a small head of water is used to trap and keep back the bad air, the resistance of the water is small, and the air is not intended to pass through it. In the air-pump there is a greater head of water, the resistance is greater, and the air is intended to pass through it, and the air is also retarded by the valves which have to be lifted by pressure.

In this old type of pump, the water has been made the first consideration, and the air has seemingly received very little attention, and has been regarded as quite a secondary matter. In it the water is aerated by the air passing through it, and most of this aeration takes place after it is in the barrel, and tests show that this aeration is then great. The air which the pump is intended to deal with is really far more important than the water, and this was evidently realised by Watt when he christened his invention the "air-pump."

Mr. Edwards has not followed the beaten track, but has carved out a road of his own in designing his pump, as the position of the two functions have been reversed—the air has been considered first and the water second. The general form of the pump will be seen from the adjoining diagrams, in which Fig. 1 is a sectional elevation of the pump, showing the bucket nearly at the bottom and the ports in the barrel open and clear. Fig. 2 is a part sectional plan of the same. Fig. 3 is a sectional elevation of the pump, showing the bucket at the bottom of its stroke and the water as it is delivered upwards. Fig. 4

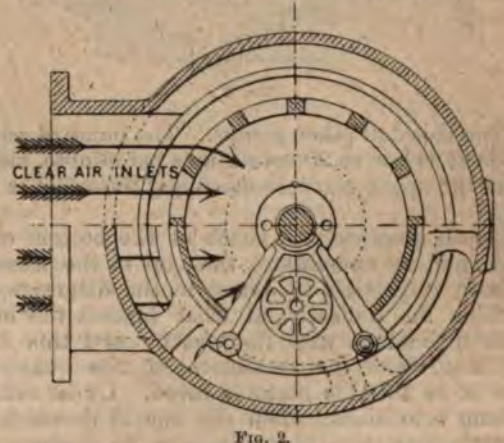


Fig. 2.

shows the method of renewing the whole of the valve while the engines are running at full speed. Fig. is illustrative of the obstructed air inlets n the fo ot-valve of an ordinary air-pump.

In Edwards' pump the condensed water flows by gravity into the base; when the bucket descends, the point of the cone enters the small amount of water, that has to be lifted, silently and without shock; and there

is given to the water a high velocity which carries it up through the ports in the barrel, and such is the velocity that much of the water hits the valve-seat. The return or upstroke of the bucket closes the ports and the rising water is followed by a rising bucket, and discharged through the valves at the top of the pump. The lower part of the pump is so constructed that the water passes through the lower parts of the ports, the upper portions being left clear for the perfectly free entrance of the air. Neither gravity or pressure is required to make the water pass into the barrel, and therein lies one of the essential differences

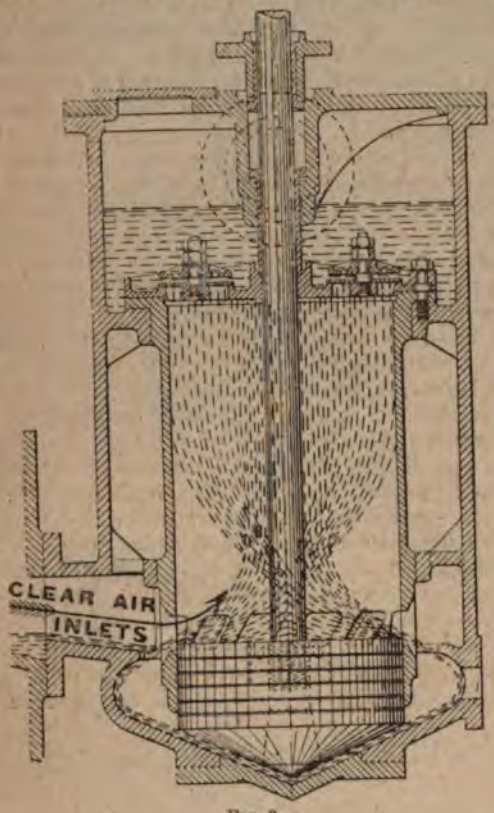


Fig. 3.

between this and other pumps. The pump gives good results at as low as 20 revolutions per minute, and the higher the speed the more efficiently the water is dealt with.

There is absolutely no shock at the bottom of the stroke, and we understand that up to the present it has been impossible to detect in the diagrams or by watching the indicator, at what instant the bucket comes in contact with the water; and this is not surprising when the smallness of the quantity of water to be lifted is borne in mind. Under ordinary working conditions, when the bucket descends and the ports first open, there is in it no obstruction in the form of water traps or valves, and the air has a perfectly free entrance to the barrel, as shown in Fig. 1. Subsequently, when the bucket comes into contact with the water and the latter, by the direction given to it by the curved bottom of the casing, enters the barrel, the upper and by far the larger parts of the ports are clear as shown in Fig. 3, and this is what is required, because the pressure in the pump and condenser should be that due to the temperature of the feedwater, and the exhaust pressure in the cylinder should as nearly as possible approach that in the condenser. In fact, there should be no obstructions between the low-pressure piston and the inside of the pump barrel in the form of either water traps or valves, which can possibly tend to raise the pressure in the condenser, and, therefore, also in the cylinder; since anything which does tend to raise the pressure may involve a loss of power.

It is impossible in the condenser or in the pump to get a lower pressure than that allowed by the temperature of the water; consequently in this pump the lowest pressure above the bucket will be due to that temperature. Thus there cannot be a loss of power due to a practically perfect vacuum being formed above the bucket during its descent, as one might at first imagine.

The pressure above the bucket and in the condenser below the bucket are practically the same, viz., the temperature pressure. The free entrance for the air is a very important point, which should be carefully borne in mind. Where the air and the water come into contact, the water is travelling at a high velocity in the barrel, and thus the water is employed to assist the air in by induction. The tests with the glass models prove that the water becomes aerated before it enters the barrel in the Edwards' pump; whereas in the old type the air has to pass through the water

Fig. 4.

standing on the foot-valves or in pumps which have no foot-valves through the water standing up in the barrel, because, in the latter pump, the water must stand at a high enough level in the barrel to enable some of it to pass on to the top of the bucket when it is in its lowest position. In Edwards' pumps the action is reversed; the water passes through the air

on its way to the barrel which tends to assist it; and the water lying in the bottom of the pump is, to a small extent, also churned up with the air; consequently, the water actually carries some air in with it.

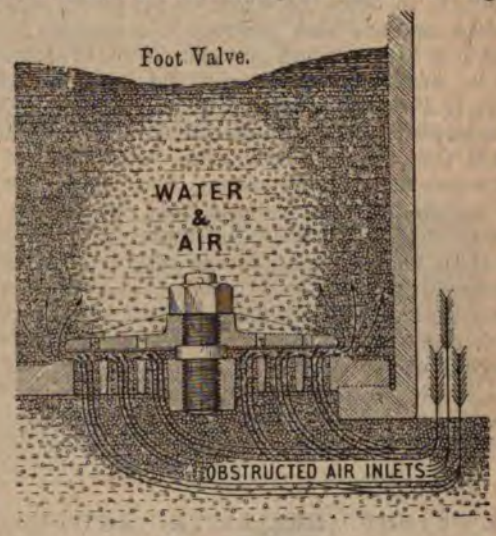
Again, in the ordinary air pump the clearance between the bucket and head-valve-seat is large. The water in this space must clearly be the most aerated water that is in the pump. Before the pump can discharge all the air in the clearance space it must be compressed up to and above the atmospheric pressure: immediately the bucket descends the whole of these air bubbles expand, and this increases the pressure in that part of the pump in which there ought in the first instance to be only the pressure due to the temperature. The clearance in various pumps greatly varies; it may be almost anything according to the proportions adopted; the greater this is, and the larger the quantity of air the pump has to deal with, the more inefficient the pump becomes as an air-pump, and the efficiency drops just at the time when it is most wanted to be high.

In the Edwards pump this space can be reduced until the bucket nearly touches the valve-seat. These are interesting theoretical points which tend to prove that the design of the old pump is bad, and that in the new pump some attempt has been made to make it correctly. It will be generally conceded that these points become of practical importance directly air finds its way into the condenser, through the glands leaking or through a porous casting.

On board steamers it requires a very painstaking and persevering man to so prevent the air from finding its way to the condenser through the above channels, or one or other of the various ramifications of pipes connected with the condenser, that he may obtain at a low temperature only the pressure due to the temperature. Indeed, it is a regular custom with some builders to fit pipes and cocks for the purpose of drawing the air out of the feed pumps into the condenser, which practically means a regular supply of air. The pressure in the condenser ought evidently to correspond with the temperature of the feed, and if it does not, an unnecessary loss is taking place. This is a point which has been much neglected, probably owing to the difficulties encountered in ascertaining whether they do correspond. At first sight it is not clear why a pump which has been made of ample size, and the valves of which are new, should give poor results; but the cause appears to be simple enough: if the clearance water were solid water, as might be supposed, the pump would be on a different footing, but as the clearance water is always permeated with air bubbles, the more air the pump is required to throw the more aerated such water becomes, and the lower the efficiency of the pump. Further, the more air there is contained in the clearance water the higher will be the pressure in the pump at the commencement of the down stroke, when it should be only that due to the temperature of the water.

Again, if the pump be required to draw a quantity of air, the head of pressure necessary to drive the air into it must be considerable, and this will be best appreciated by engineers who have experience in ventilation and forced draught, and therefore know how little obstruction will make a difference in pressure; how much more then in a pump with its valves designed as shown in Fig. 5, which is a common instance, will a head of pressure be required to lift a valve which is adhering rather tightly to its seat, owing to the sticky grease, which is usually to be found between the valves and their seats, and to drive a quantity of air down through the water and then up through the contracted spaces in the seat, and through the still more contracted area due to the lift, all of which spaces are blocked with water! The friction due to and the head required for driving a large quantity of air at a high velocity through these obstructions must be great.

Fig. 4 illustrates the method of cleaning and renewing the whole of the valves when the pump is going full speed, which operation, we understand, can be carried out without it being possible to tell by the gauge when they are being changed. The result of this design of pump is that a cheap type of valve can be used until it is worn out, without risk of inconvenience or breakdown, and it being possible to go to sea even with old valves, and renew them easily while under weigh.



Ordinary Air-pump.
Fig. 5

Another very great practical advantage is the enormous reduction in the time required to overhaul the pump; because, when it has once been thoroughly tried and afterwards examined, so that it is known to be sound, it will rarely be necessary to open it up for examination, as the whole of the valves can always be got at whatever the position of the engines and without disconnecting any gear, thereby saving an immense deal of time.

There being no valves in the bucket, the circumference is the only portion which can possibly leak and require sealing. We understand that experience has proved that such complete control of the water is obtained that the top of the bucket can be made of such a form as will cause the greater portion of the water to flow to the circumference, and thus more effectively seal the only part that can leak. In this direction it may be interesting to note that with a view of ascertaining how long one of these pumps can possibly hold the vacuum when it has been stopped with the bucket above the ports, and with the valves clean and in good order, tests have

been made with the pump at the inventor's offices, cold water being used. When it was stopped the vacuum was 29 in., and the drop was at the incredibly slow rate of 17½ in. in a little under 4 days with a head of water of about 6 in. on the top of the valve.

On the question of the packing of buckets there is no doubt that much power is lost in this way, and the friction after freshly packing is so great in some instances as to materially reduce the number of revolutions, and we understand there is on record one instance at least in which the friction set up by the packing swelling when it was wet, that on the engines being started the pump-rod actually broke, and it is the inventor's opinion, founded on actual practice, that, provided the bucket is a good fit, there is absolutely no need for it to be packed at all, even when very low pressures are required.

As an instance of showing the practical utility of reducing to the lowest amount the pressure required to lift the valves in an air-pump, we will suppose, for example, that it takes a third of a pound pressure per square inch to drive the water up the barrel and lift the valves, and the back-pressure be increased by this amount in a low-pressure cylinder 74 in. in diameter, by 54 in. stroke, at 60 revolutions per minute, the effective H.P. will be reduced by 23.

An interesting detail in the design to avoid breakdowns is that the nuts and other accessories of the valves are so made in dimensions and shape relative to the orifices in the valve-seat that the former can never drop through the latter into the barrel of the pump.

We shall look forward to the obtaining of definite comparative results from the Edwards pump and an ordinary pump under similar conditions and circumstances, and we congratulate the inventor upon the thorough and ingenious methods by which he has arrived at the conclusions which led him to leave the beaten track and evolve a device which has every appearance of having great practical and commercial utility.

THE PATENT "HEZZANITH" ARTIFICIAL HORIZON.

THAT enterprising firm of nautical instrument makers, Messrs. Heath & Co., Limited, of London and Crayford, have once more shown their ability of being up-to-date by placing on the market an extremely ingenious and simple device, which enables an observer to obtain with very close approximation the true horizon on a dark night, during foggy weather, or in places where the horizon cannot be seen; a matter of course of the very greatest importance to navigators and travellers.

Many attempts have been made for years past to provide an artificial horizon, either attached to or distinct from the sextant; many of these methods have been adaptations of the principle of the pendulum with various modifications, and nearly all have failed, through being so exposed as to be seriously affected by the wind, or so sensitive that it is impossible to use them with any success at sea. To avoid these defects oil chambers and other such methods have been devised with varying success. The patent "Hezzanith" Artificial Horizon, which we illustrate attached to a sextant in the accompanying diagrams, is constructed on the principle of the pendulum, is self-contained, and from a practical standpoint is entirely uninfluenced by any force other than that of gravity, and of the damping effect of the liquid with which the operative mechanism is surrounded.

The construction of the device is extremely simple, and we understand, that, from all the reports obtained, seems to remedy all the serious difficulties hitherto experienced. Fig. 1 of the diagrams illustrates a sextant with the artificial horizon attached, mounted on a patent telescopic stand, which has been found most useful in taking observations, acting as it does as a steadying device. Fig. 2 is an enlarged view of the device, with the lamp attached for night work. And Fig. 3 a similar view with the lamp removed for day observations.

Fig. 1.

The artificial horizon consists of a tube with special telescope lenses at either end, filled with ordinary pure water. Within this outer tube is the pendulum with a pointer attached, the pendulum bob consisting of a horizontally disposed plate. This pendulum is hung on knife edges, and is wholely immersed in the water; consequently, its oscillations are damped by the movement of the plate bob through such water. A fixed pointer is arranged in the tube adjacent to the path of the pointer carried by the pendulum, and when the instrument is placed in a perfectly horizontal position and the two pointers are coincident, the true horizon is indicated.

Upon the outer tube at about the centre thereof a

chamber having an end consisting of a flexible diaphragm is arranged to allow for the expansion and contraction of the liquid contained in the tube, due to variation of temperature.

A lamp is detachably hung upon the outer tube, can be taken out at pleasure. At the object glass end of the instrument is a screw collar by which it is attached to the rising piece of the sextant, or in the case of the "Hezzanith" sextant, a full description of which we gave in our issue of May, 1895; this end

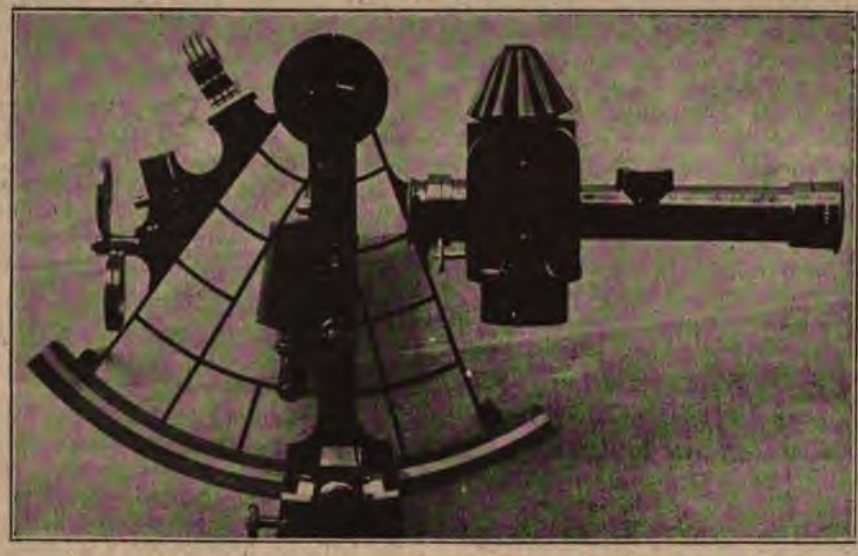


Fig. 2.

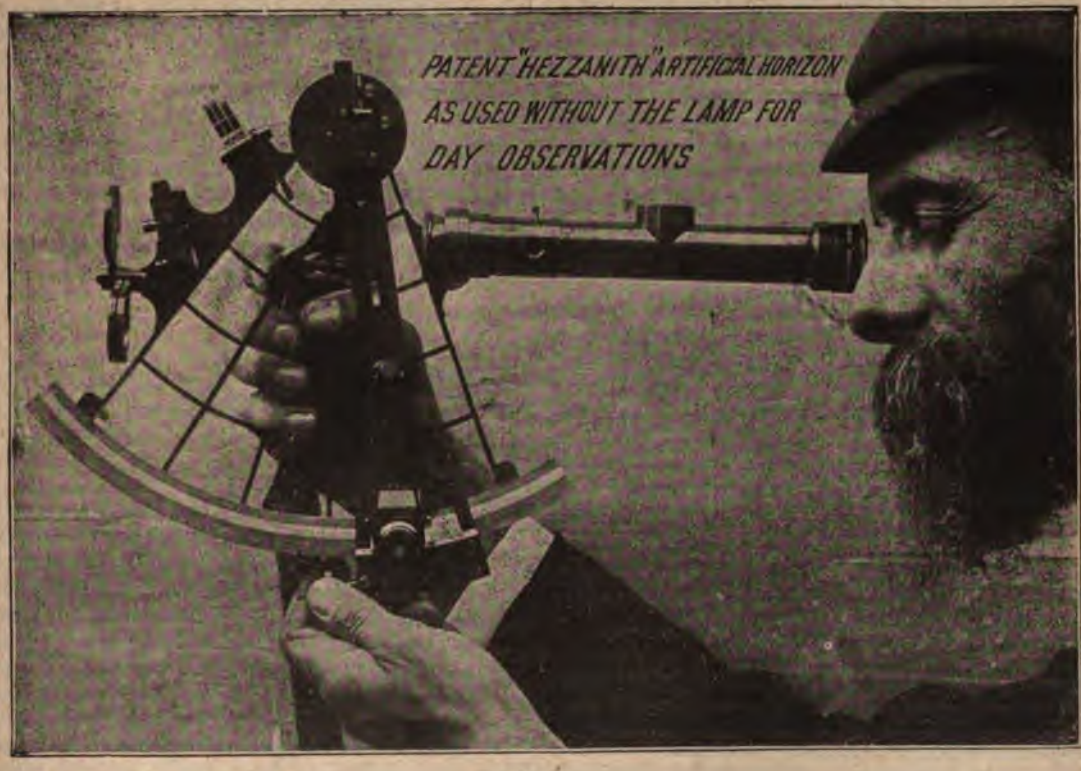


Fig. 3.

opposite an orifice in the latter, which is covered with specially tinted glass, and adapted to so diffuse the light from the lamp that the pointers may be seen at night. At the eye end of the tube is a screwed cap, which forms an hermetically sealed joint, and which merely slides into its place in a similar manner to the "Hezzanith" telescopes.

A very handy tool is supplied with the instrument, consisting of a flat piece of hardened steel, which has a screwdriver edge on one side, and two pins on the

other, and is used to open the inlet when the tube requires cleaning, and fresh water is supplied to it.

Having fitted the instrument upon the sextant, the observer looks through the eye-piece and raises or lowers the sextant until the pendulum pointer coincides with the fixed one. Then by the index in the usual way he brings the object, sun, stars, etc, to cut the pointers as they coincide. It may be noted that the makers consider it best to bring the object on to the fixed pointer, using the moving pointer to keep the instrument steadily in the horizontal plane.

The lamp is made readily detachable from the tube, so that the observer may detach it and use it to illuminate the index and scale, to enable him to take the readings at night with facility. The lamp is of special construction to prevent the waste or loss of oil therefrom should the lamp be held out of the vertical.

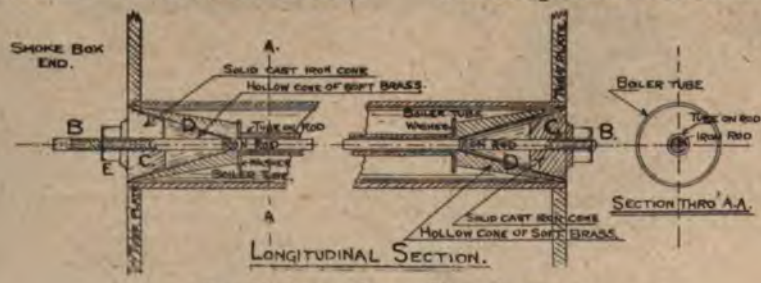
We have had the opportunity of thoroughly examining this instrument and testing its merits, and can bear testimony to the fact of its being a most simple, ingenious, and easily manipulated device. It may be noted that when using this instrument no allowance need be made for the height, the observer may be from the ground, base, or sea level, as in ordinary calculations.

THE METALLIC BOILER TUBE STOPPER.

ONE of the most important adjuncts of a boiler-room at sea is a good and efficient tube stopper, and the present rise in steam pressures has made the want of such an article still more a necessity, and has brought out the imperfections as regards leakage of more than one stopper as at present used.

It is useless to attempt to make a permanent joint with such a stopper except by metal on metal, and the metal making such a joint upon the tube should be a comparatively soft metal to close interstices or irregularities in the tube mouth.

To drive such a soft metal home it would be necessary also to use a hard metallic core, so that even this apparently simple device requires a considerable amount of engineering ingenuity.



THE METALLIC BOILER TUBE STOPPER.

It would appear that the new stopper we illustrate, which has been patented by Messrs. Scott, Reedman & Co., and is manufactured for the market by Messrs. J. R. Reedman & Co., of Canning Town, London, E., fulfils admirably the above conditions for efficiency under high steam pressures.

It consists of an iron rod, BB, at either end of which are the cast-iron solid cones CC, and these solid cones fit into hollow cones of soft brass, DD. In this way the soft hollow cone D, being of thin section at the outer end, is eminently capable of being forced out by the internal solid cone, so as to absolutely close with a metallic joint the blowing end of the tube, and any amount of closing pressure can be obtained by screwing up the nut E on the threaded end of the rod B.

When the stopper is used at sea it is inserted in the usual manner from the smoke-box end, and the tightening of the nut E expands the brass of the soft cones simultaneously on the tube ends, immediately where they are in contact with the firm resistance of the tube-plates. This joint makes the tube perfectly steam and watertight at both ends under any of the present high steam pressures.

Beyond this an important advantage of a metallic joint, such as this made by Scott & Reedman's stopper, is that it can be depended upon to last and not to give further trouble by leaking again.

HICKMAN'S PATENT "X'L ALL" RUDDER FITTINGS.

ALL who have any experience of the management of small boats or canoes, whether on the sea or river, or other inland waters, know too well the annoyance and inconvenience, and even the danger, caused by the unsatisfactory and unsafe character of the ordinary fittings for a rudder, viz., the common pintle and gudgeon.

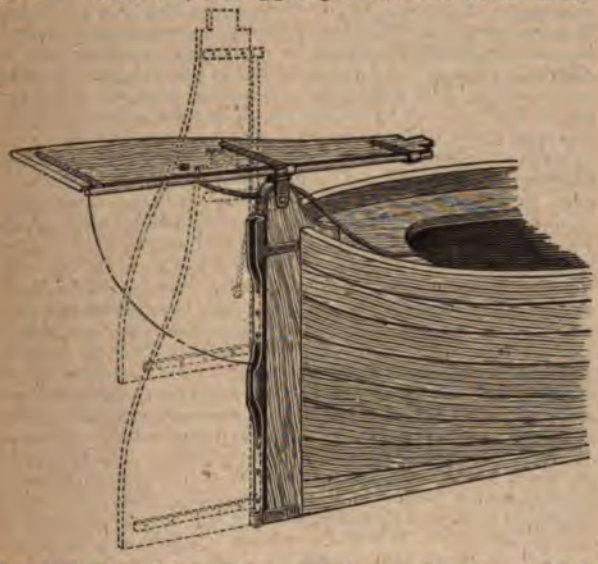
With this ordinary fitting the shipping of a rudder even in smooth water is a matter of difficulty, it being necessary to hunt about with one's arm in the water to find the fitting, and in rough water the difficulty of the task is greatly increased, whilst the ease with which the rudder becomes unshipped by the wash of water or through the boat grounding aft, or coming into contact with an obstacle, causes much inconvenience and loss of valuable time, and at times considerable danger and loss of life.

We have pleasure in illustrating in the accompanying diagram a new form of rudder fitting which has been invented by Mr. J. D. Hickman, Thames Ditton, Surrey, which it is claimed has the great advantage of being so arranged that the rudder can be shipped and unshipped inboard with the greatest ease and safety in the roughest weather or at night time; the rudder also need not be shipped until the boat is in the water, thus preventing it from being injured against the davits, the ship's side, or becoming unshipped when first touching the water, or in passing over ropes.

By reference to the diagram it will be seen that the rudder is fitted at the forward end with a hinge-pin, supported at intervals by brackets, and having the lower end of the hinge-pin projecting slightly below the

bottom bracket. The fitting on the stern post of the boat consists of a footstep at the lower part, a bearing in the middle part adapted to embrace the hinge-pin, but with a slot at the back wide enough to allow the necks of the brackets to pass therethrough, a slotted guide at the upper part, and a knuckle-piece hinged to the top of the stern-post, carrying a slotted bearing similar to that at the middle part of the stern-post; a pulley is also mounted on the upper part of the stern-post preferably on the pivot-pin of the knuckle-piece, and a cord is attached to the rudder which runs over this pulley to haul the rudder upward and inboard.

To ship the rudder, it is held in a vertical plane with the hinge-pin horizontal, and the latter is passed through the bearing in the knuckle-piece; the rudder is then allowed to fall into a horizontal plane, the knuckle-piece turning on its pivot. The cord is placed over the pulley by which the weight is taken, and the rudder is turned up into its vertical upper position as shown in dotted lines, so that the hinge-pin is engaged by the upper guides; the whole is now



lowered, the hinge-pin engaging with the middle bearing and bottom footstep, and is then in position, as shown in dotted lines.

When it is desired to unship the rudder the cord is pulled, which draws it up and places it in the position as shown in full in the diagram, from which it can be readily drawn into the boat.

We understand that these fittings have been adapted by the Royal National Lifeboat Institution, and have been supplied to the Harwich, Campbeltown, Weston-super-Mare, and Valentia Lifeboats, and also fittings are in course of construction for boats for the Union Steamship Co. and the Royal Mail Steam Packet Co., etc. By the kind permission of the Secretary of Lloyd's Register of Shipping, models have been placed at the offices at the Royal Exchange and White Lion Court; the committee of this society thinking very highly of the device.

We understand also that the fittings are widely known on the upper reaches of the Thames, and are highly appreciated.

They are being placed on the market by Mr. C. R. Elderton, of 4, New London Street, London.

H. E. MOSS & CO.'S STEAM SHIP CIRCULAR

THE interval between the issue of their last steamship circular in March and September 25th has been one of the most momentous for many years in steam shipping and the allied shipbuilding and engineering trades. The boom in freights last year was very short-lived; caused partly by the concentration of large amounts of tonnage in particular parts of the world, whereas large masses of produce—principally cotton and grain—had to be moved quickly from the West, which, by means of the enormous modern cargo steamers, was soon effected, and freights fell to practically their former dead level. To-day the crops in most European countries are, if not a failure, most deficient in quantity and quality, which, combined with the plague and shortness in India as well as in Argentina, will necessitate enormous quantities of cereals and other produce being transported from America (both eastern and western seaboards), also from Australia and other long distances. As a natural consequence, the price of wheat has risen to a higher point than for many years past, and freights have advanced considerably all round, and will probably still further improve. The great strike now pending in the engineering trade, and likely to continue for some time, has put off the delivery of practically 250,000 tons of shipping this year, but has been to shipowners like a blessing in disguise, insomuch as it has tended to equalise the difference between supply and demand in the production of steam shipping. Trade in the United States of America has recently improved by leaps and bounds, and is still increasing. The improvement in America invariably reacts on this as well as other European countries, which have for months past already shown by their official returns a more healthy tone in commerce.

From reasons above expressed, and once given normal condition of affairs in India and Argentina, they are happy to say that after so many years of pessimistic opinions the prospects of steam shipping to-day are more hopeful and healthier than they have been for many years past, and, what is of more importance, are likely to continue so for some time to come.

Very few orders for new steamers, except for liners, have been of late given out, in consequence of the uncertainty of delivery caused through the great engineering strike, which is already driving many orders to the Continent. A large number of useful second-hand steamers have been sold, principally to foreigners; and they anticipate, during the coming winter, a still larger demand and an improvement in values.

Prices for building have, they may say, during the last twelve months, advanced fully 5 per cent., and in many instances more so; and with increased wages and cost of materials, they don't see how they can be lower.

As predicted for years past, they are glad to say our large companies and others have become alive to the fact of the necessity of weeding out their old and obsolete tonnage, and many steamers have been sold for breaking up. There are still many hundreds of thousands of tons that must be disposed of, and the sooner the better, as their money-earning powers have vanished for ever.

Sailing ships have almost become a drug on the market, and except for large-sized vessels employed on long voyages, it is now almost an impossibility to employ them profitably. They fear their days are numbered in competition with modern cargo steamers, unless for ships subsidized by foreign countries.

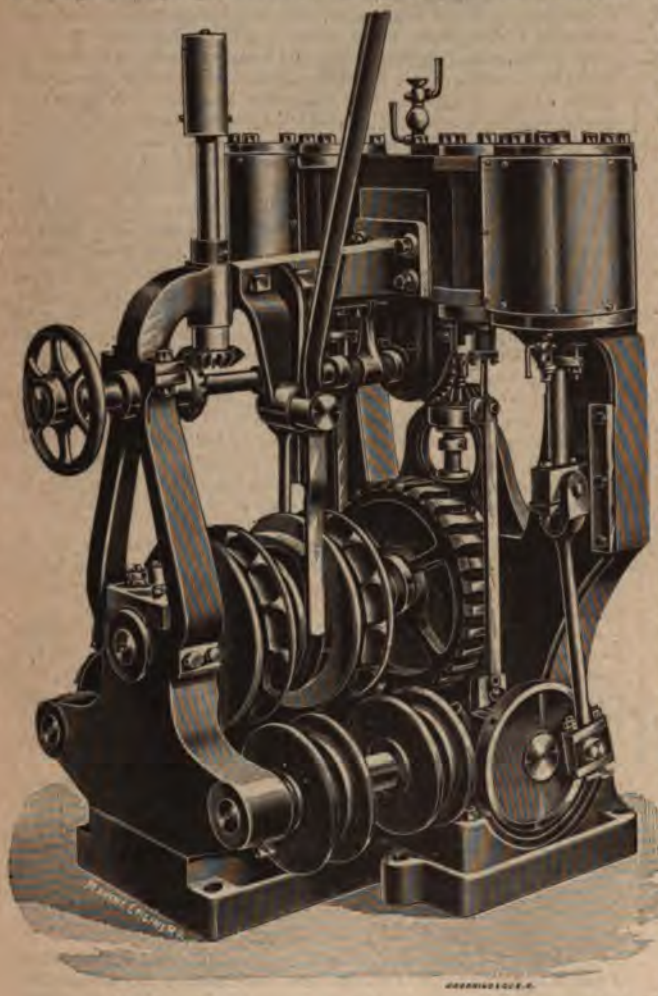
Correction.—It has been brought to our notice that in the review of the August number of the MARINE ENGINEER, of Mr. Haldane's recent book on Engineering as applied to Railways, there was an error. We spoke of his description of the Atlas Works at *Sheffield*. We should have said the Atlas Works at *Glasgow*. The former, of course, are more in the minds of those who, like ourselves, are principally concerned with shipping affairs, but the former are naturally those which would be dealt with as they are in the book under notice since they are chiefly concerned with railway engineering. We can only express our regret for the slip.

For want of space we have been obliged to hold over Reviews, Patent List, and part of Board of Trade, etc., until our next issue.—[ED. *M. E.*

THE HARRISON STEERING ENGINE.

CONSIDERABLE energy and enterprise is shown by the manufacturers of auxiliary engines for steamships, which is well exemplified by the Harrison Engine Co., Limited, of Ocean Works, Rumford Street, Cross Lane, Salford, Manchester, in the new type of steering engine that has been placed on the market by this firm.

We have pleasure in illustrating this engine, which represents one of their new powerful and compact-vertical type, arranged to steer either the bow or stern rudder at will, by the movement of one clutch lever actuated from the wheel-house. This engine is fitted with piston slide valves, and equilibrium piston controlling valve, each of which



are provided with broad cast-iron rings. The valves work in cast iron liners having the ports cut out of the solid.

The total space occupied by the engine fore and aft being 2 ft. 4 in., and it is considered by the makers that this great economy of space is a leading feature of this design.

Several of the engines have been fitted to high-speed cross-channel steamers having speeds up to 22 knots per hour, they have also been fitted to the new paddle steamers *Ruby* and *Pearl*, which have been built by Messrs. John Jones & Son, of Brunswick Dock, Liverpool, to the order of the Eastham Ferry and Hotel Syndicate, under the superintendence of Messrs. Flannery & Tritton, of London and Liverpool.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

The Celebration of Trafalgar Day.

THE twenty-first of this month is a day which, it is to be hoped, will live long in the remembrance of every Englishman. Various schemes have been put forward for the celebration of Trafalgar Day, the Navy League being naturally first and foremost. It is the intention of this body to again decorate the column in Trafalgar Square, but not exactly in the same fashion as last year, as this year they have arranged to dispense with the services of the steeplejacks, about which there was so much talk twelve months ago. The secretary announces that he has put himself in communication with the various colonial branches with the object of simultaneously celebrating the day all over the globe. An attempt will also be made to bring about a general observance of the day in the Fleet, by making it a holiday for the men combined with entertainments, or decorating the vessels. A correspondent has written to the League pointing out the neglected state of the obelisk, erected to the memory of Nelson, on Portsdown Hill, and urging that a small fund be got together for its restoration. An inscription on its base points out that it was put there "by the zealous attachment of all those who fought at Trafalgar to perpetuate his triumph and their regret." The proposal is that the League take the matter in hand, and thus preserve to the nation a striking memorial of the great Admiral. Gilding the domes of Greenwich Hospital is put forward as another appropriate method of commemoration, and still another is on the 21st, a dinner be given to all the naval veterans of the Portsmouth district who have fought in battles during Her Majesty's reign. The Mayor has granted the use of the famous Town Hall, and the dinner is to take place under the patronage of the Duke of York, the First Lord of the Admiralty, and the Commander-in-Chief at Portsmouth. Of course there will be the usual batch of publications dealing with Nelson, but two which will attract the most attention are undoubtedly those to be issued from the offices of Messrs. George Newnes and Messrs. Harmsworth respectively. The former will be issued in one book, and will consist of forty-eight pages, and contain over a hundred superb illustrations, but the latter will be published in several numbers, and will also contain many excellent illustrations. It is to be entitled "Nelson and his Times," and will be edited and written by Lord Charles Beresford and Mr. W. H. Wilson. The special number of the *Navy and Army Illustrated*, sent out from the office of Messrs. Newnes, will be called "Nelson and Trafalgar," and will be edited and written by Com. Charles N. Robinson and Mr. John Leyland.

The Engineering Dispute and Government Work.

The dispute which is still being carried on between the engineers all over the country and the Masters' Federation shows no signs of being amicably settled yet awhile, and it is with regret that the fact has to be chronicled of the bad effect it is having upon naval shipbuilding as regards the work in hand both in the private and Government yards. Trial trips and launches have had to be postponed, and where the trials have taken place naval ratings have had to take the place of the contractors' men; as, for instance, in the case of the *Arrogant*, whose trials have had to be carried out with men who were entire strangers to the ship, but in spite of which everything seems to have gone off fairly satisfactorily. The Government, it appears, decided that the trials of this ship should take place, and to fill the places of the contractors' employees on strike, resolved to make use of a staff of picked naval ratings. The ship being still in the hands of the machinery contractors, Messrs. Earle, the local officers of the A.S.E. immediately decided to withdraw the contractors' chargemen who had been allowed to remain at work during the dispute in order that the machinery of this vessel should be kept in an efficient condition. At the same yard, too, there are in hand the *Furious*, second-class cruiser *Perseus* and *Prometheus*, third-class cruisers, and

Dove and *Bullfinch*, torpedo-boat destroyers. The lock-out which took place early in July prevented any trials of these vessels taking place. The torpedo-boat *Panther*, too, met with some delay. Messrs. Laird Bros., the contractors, although they made every effort to get her away on time, were unable to do so, and were obliged to call in the assistance of a navigating party from the local depot.

The Attitude of the Admiralty.

The Admiralty, it seems, have no desire to mix themselves up in the struggle in any way whatever. Messrs. Laird, it may be mentioned, applied to the Admiralty for assistance in opening up the boilers of the new torpedo-boat destroyer *Ernest*, as they were unable to do so themselves owing to a scarcity of men. She was delivered at Devonport some weeks ago, and went through all her trials in a satisfactory manner, but before her final acceptance her machinery had to be opened up by the contractors for survey, and to do this Messrs. Laird had no mechanics available, and so applied to the Admiralty to allow their Keyham mechanics to open up the machinery at their (the contractors') expense. This the Admiralty refused to do on the ground that they did not wish to interfere in the dispute. The Government is stated to have in its employ some 20,000 men who are members of the Amalgamated Society of Engineers, and that at the Devonport yard nearly 80 per cent. of the engine fitters are members, and it was reported, but is quite incredible, that if any of them were ordered to take the place on board ship of any of those contractors' men who are on strike, the whole of them would refuse, and if the question were pressed they would strike in a body. The *Arrogant* trials shows the inaccuracy of this story. The completion of many of our battleships have however, been seriously delayed, and during the past month matters have decidedly not improved. Mr. Barnes, the secretary of the A.S.E., had it given out before the chargemen were withdrawn from the *Arrogant* that the officers of the society were willing the men should go in and finish the Government work whenever the Government wished it. It appears that the withdrawal of the men was undertaken in his absence, and that on his return he expressed his deep regret that it had been taken, and that headquarters had not been consulted in the matter. The society did not wish to put anything in the way of the building of our battleships, but this is what is being done, perhaps not directly and purposely, but progress has been obstructed to some extent all the same. Many trials have been abandoned and delayed for the time being because of the strike. The Admiralty appear to have tired of waiting for the end, for they have decided to carry out many of the trials with picked men drawn from their own depots. Among other vessels delayed in launching may be mentioned the *Canopus* at Portsmouth, the *Vindictive* at Chatham, and the *Cæsar*, which was to have been completed for sea by the end of last month, but will now have to wait until December.

Pembroke Dockyard.

The *Hannibal*, on her departure from here, was about the most finished vessel of her class which has ever left this port for completion elsewhere. Her barbettes and gun mountings, casemates, lids and pedestals, &c., were practically complete, and the chief work yet to be done on her is that on the submerged tubes and the fitting and fastening of the bilge keel. It is thought that the *Andromeda* will now make better progress than she has been doing lately, owing to the departure of the *Hannibal* releasing a great number of men, who will now commence work on the former ship. Her engines are already in position, and she will very shortly receive her boilers and masts. We have received the drawings of the new Royal yacht, and preparations are now commencing for ordering the materials necessary for the work. Great precaution is being taken to allow nobody but those concerned to get any information about her, though why this step is being taken cannot be divined, as her engines and general machinery will most likely be built by contract, and when she is in course of construction sketches of all parts of her can be easily obtained. It is proposed to spend some £20,000 for labour on her during the current financial year. Work on the *Spartiate* is almost at a standstill.

Naval Prize Money.

An account which has been recently laid before Parliament, showing the receipt and expenditure of naval prize money, bounty, salvage, and other moneys, contains much curious information on these matters. In it we find the amount of bounty awarded to ships which have taken part in the last few years in the suppression of the slave trade, and how the booty captured at recent punitive expeditions—chiefly in Africa—has been distributed. But what chiefly calls for comment in the paper is the amount of prize money awarded over forty years ago, and as yet undistributed. For instance, there is a sum of £884 3s. 4d., balance of portion of booty captured in Pegu in 1852-3, and "allotted to the officers and crews of Her Majesty's ships," which is still in the hands of the Government. Similarly there is £1,140 13s. 3d., part of the booty captured at Canton in 1857, and awarded to the naval squadron; £5,851 15s. 11d., left over from a grant made by Parliament for special service on the China station, between October and June, 1858; £1,064 16s. 9d., the balance of the net proceeds of junks captured on the Canton river in 1857, while attempting to run the blockade; and £738 12s. 11d., prize money awarded to the *Shannon* and *Pearl* for services rendered during the Indian Mutiny. No reason is given as to why this money has not been given to those for whom it was intended. A great many survivors of all these actions must be still alive, and according to accounts sadly in want of a little money. It has been suggested that one of the members of the House of Commons interested in the naval service raise the question whether it cannot be used to benefit these men in some way. The paper also contains accounts of the prize moneys and awards given to ships in recent years for services in connection with the capture of pirates and the putting down of the traffic in human flesh, which still goes on in certain parts of the East.

Sheerness Dockyard.

Work here has been fairly plentiful during the last few weeks. Several destroyers' trials have taken place, including those of the *Mallard*, which vessel passed her contractors' trials without the least hitch. The contract asked for 5,400 H.P., but the mean results of the three hours run was 349 in excess of this, giving her a speed a little above 30 knots. The *Haughty*, *Janus*, *Salmon*, *Sturgeon*, and *Snapper*, went through their seventeen days' cruise in a satisfactory manner, but the *Contest* had to shorten hers on account of a leak in her fore compartment. The refit of the *Acorn* and *Racoon* have not yet been commenced, and the first-named will need repairs of a somewhat extensive nature in direct contrast to the *Racoon*, which looks very fit and trim. The *Sans Pareil* is having her decks caulked and repairs done to her machinery and electrical fittings. The *Pomone* and *Proserpine* have still a great deal of work to be done on them. The *Pomone* is to be ready for launching by the end of next month, and the *Proserpine* was to have been ready by early spring next year, but it will now be June before she is ready for the pennant. She is now only having her machinery placed on board. The *Champion*, of the training squadron, which has just completed a seventy-two days cruise in Iceland and round Norway, has arrived here for a refit in readiness for the winter cruise. The gunboat *Onyx* arrived from Harwich in order to be docked for refit prior to resuming her duties, the gunboat *Leda* having already done so. The *Onyx*, however, left without refitting, and will return later for the work. The *Rodney* has just paid off here, and recommissioned to replace the *Edinburgh* as coastguard ship at Queensferry. She has taken over the crew of the *Edinburgh*.

Guns v. Armour.

The never-ending struggle for supremacy botween armour and guns goes on without cessation, and the latest development seems to be somewhat in favour of the projectile. In a trial which recently took place at Shoeburyness two 6-in. projectiles were fired at a Harveyised plate, and succeeded in penetrating it, going clean through the timber backing, and landing some 20 ft. in the rear. In the first trial a 12 in. plate, treated by the Harvey process, was used, the conditions of the trial being that the plate should stand three shots from a 12-in. gun, the striking velocity of the first two being 1,850 foot seconds, and the third not less than 1,800 foot seconds. The two first shots penetrated less than 3 in., and then it was decided that a velocity of 1860 foot seconds should be given to the third, but the result was that only 2½ in. of plate were penetrated. Holtzer projectiles of 714 lbs. were fired from a 12-in. breechloader. The plate was reckoned to have satisfactorily stood the tests, and was accepted as meeting the conditions imposed by the Admiralty. At the second trial a 6-in. Harveyised plate was experimented upon, the same kind of projectile being used. The first two shots that were fired failed to penetrate more than 2½ in., and therefore two

Hadfield projectiles were brought into requisition, each having a velocity of 1,940 foot seconds. They both went through the plate and the wood backing, which was splintered in all directions. The Holtzer has long been regarded as the standard projectile, but after these tests it is to be hoped that the Admiralty will give more attention to the Hadfield as being possibly the better of the two. The result of the experiments carried out in Russia with a view to increasing the striking velocity is that they can now fire a projectile up to 2,850 foot seconds. Here we have attained a velocity of 2,300 foot seconds, but this severe test is never applied in armour-plate trials, with the result that the plate used in our battleships is easily penetrable with such velocity as is to be attained by the new Russian powder.

Salt for Our Seamen.

The decision of the Admiralty to supply the lower deck with salt as part of their service ration is a step which ought to have been taken long ago. For many years past mustard, vinegar and pepper have been provided, but until now their lordships do not appear to have been alive to the fact that the food eaten by our seamen requires a certain amount of this homely condiment to make it palatable. It is a thoughtful act on their part, which will be appreciated in all parts of the ship. Maybe the delay in taking the step was attributable to the extra expense which would be incurred, for it is expected that something like £10,000 will be needed to supply salt to the whole of Her Majesty's naval forces for one year, and that nearly two hundred and fifty tons of salt will be consumed. The Admiralty wish it to be known, too, that no savings will be allowed to men who do not take up their salt, but there will be very few desirous of effecting this trifling economy. At the time when salt beef was issued to ships' crews it was preserved in rock salt, and this could be obtained by the men to flavour their food with if desired, and then some excuse might have been found for the non-provision of salt from the sailor's dietary. But there is yet room for further reform in the matter of the meals and meal hours of those of the lower deck.

Devonport Dockyard.

During the past month many vessels have left this port for foreign stations, and as several of them are not exactly new some little anxiety will be felt concerning them until their safe arrival is reported. Such vessels as the *Hotspur*, *Medina*, *Medway*, and the *Phaeton*, which is acting as convoy to the torpedo boat destroyer *Sparrowhawk*, must have certainly felt the effects of the heavy weather. The *Raleigh* has been in dock here since February last, and to all appearances will only just be ready to take the place of the *Active*, the flagship of the training squadron, for their winter cruise. The Admiral Superintendent had informed the Admiralty lately that she cannot be ready until the 25th of next month. The trials of the gun and torpedo-boat destroyers *Thrasher* and *Gipsy* took place recently, and passed off satisfactorily. The arrival of the *Panther* brings the number of destroyers in the Reserve up to five. She is the twelfth vessel of this type which Messrs. Laird have delivered. The other four making up the Reserve are the *Skate*, *Shark*, *Ernest*, and *Griffon*. The *Sharpshooter*, gunboat, and the *Gossamer*, torpedo gunboat, are at present having defects made good. The *Aeolus* and *Spartan*, which recently returned from the China station, will not be ready for sea again until the end of February next, and perhaps later. Although they have only served one commission abroad their refit and repairs will be very extensive. Many alterations and repairs in connection with their machinery are necessary, and altogether about £20,000 will be spent on them. The refit of the *Bonaventure* has been commenced, but she will not be out of hand until the beginning of December. Much overtime is being resorted to on the *Ocean*, and engine fitters, drillers and rivetters are working late every night.

The Navy and Wireless Telegraphy.

Much attention has been attracted during the past month to the experiments in wireless telegraphy at Dover. The experiments, it is true, were under the direction of the General Post Office, but if successful it will, it is supposed, almost immediately come into use in the Navy. The experiments are arousing considerable interest amongst naval electricians, who have already commenced trials themselves in the *Defiance*—they will doubtless last over a considerable period. Great secrecy has been maintained in the matter, and Fort Burgoyne, where the operations are being carried out, has been closed, access being obtained only with special permission from the authorities. Several Continental powers are preparing for extensive experiments, with a view to the adoption of the new system, Germany having already commenced them at the Kiel Naval Arsenal, and Russia and Austria have given notice of their intention of doing so. Experiments with Signor Marconi's invention have been carried out on an extensive scale in Italy, at Spezzia, between forts on shore and warships some miles out at sea, and communication was established over very long distances. Telegrams were sent at a distance of twelve miles, and this, in view of the fact that the induction coil of the transmitter could only give a spark of 6 in., whereas at Penarth, in Cornwall, recently, a coil, giving a spark of 18 in., had to be employed to transmit messages nine miles away, but of course this may not have been the extreme distance power of the coil. We are told that the Italian authorities secured to the mast of a ship, 90 ft. high, a vertical copper wire, ten millimetres in section, well covered with guttapercha, one end attached to the receiver on board, the other end free. Another mast of the same height was erected on shore, and the transmitter attached to its vertical wire. Two ironclads were employed, and the operations lasted for a fortnight, it being clearly demonstrated that the instruments could be securely placed deep down in the hull, messages being perfectly intelligible by the receiving instrument in a cabin 8 ft. under water, notwithstanding its surroundings of massive iron.

Chatham Dockyard.

Some important improvements and additions are contemplated here, and among them is a plan for erecting a new engine factory and other workshops. Some millions were spent originally on this dockyard, but the original scheme was not carried out in its entirety. The Admiralty, too, have decided to extend operations as far as concerns the manufacture of the powerful triple-expansion engines, as those engines built here are estimated to cost something like 15 per cent. less than those built by private firms. It is also proposed to spend a great deal of money for the purpose of constructing two new docks of a much larger size than the present one. Over £17,000 has been voted for the refit of the *Rodney*, which has returned here from the Mediterranean, but the work will not be taken in hand for some time yet. On her paying-off trial her engines realised a speed of 15 knots. The *Goliath* is making fair progress, but much delay has been caused by the late arrival of her fittings from the various manufacturers. The *Vindictive* was to have been floated out two weeks ago, but chiefly owing to the engineering strike the boilers have not been delivered, and she is to remain in dock until their arrival. The *Galatea* is in the hands of the engineering department still, but it is hoped that the defects in the machinery of her starboard engine will soon be made good, when she will once more take up the duty of coastguard ship of the Humber district. The *Minerva* has yet many alterations to be made in her, and these it is expected will cost about a thousand pounds, before she can be used as a flagship. By the beginning of the month the *Mohawk* was to have been commissioned and despatched to relieve the *Rapid* on the Australian station.

Naval Literature.

It was only to be expected that with the awakened interest taken in recent years in all branches of the naval service that a mass of literature should be published on the subject, and several of the books which have recently appeared are certainly imbued with a great amount of interest to the general public as well as naval men. Everybody connected with modern marine engineering cannot fail to be highly pleased with the special marine number of *Cassier's Magazine*. Every phase in the life of a battleship is described, how it is designed, built, launched, fitted with engines and boilers, and the great mass of auxiliary machinery without which a modern battleship is incomplete, until it is finally launched and commissioned. Of the nineteen articles in the book, which is most thoroughly illustrated by photographs and drawings, one of the most interesting is that by Sir W. White, the Director of Naval Construction, on the "Specialities of Warship Design." The writer discourses learnedly on the difficulties inseparable from warship construction. Another excellent article is that by Mr. A. F. Yarrow on "Fast Torpedo Boats," and from it we get an idea of the wonderful improvements which have lately taken place in the construction of the marine steam-engine. Sir Charles Dilke is somewhat pessimistic in his story on the "Naval Weakness of Great Britain." The *Strand Magazine*, too, has interviewed Sir William White, and in the course of an exceedingly interesting

conversation he estimates the value of the British Navy at sixty-one millions sterling, not including small ships, steam tugs, etc., and more than two-thirds of the money value of the whole Navy is represented by ships designed by himself.

Portsmouth Dockyard.

In about a week's time the *Canopus* will have been launched from here, and another magnificent addition will be made to the British Navy. It has been stated that the Duchess of York will officially wish success to the new vessel, but nobody knows exactly who will perform the ceremony yet. There is a likelihood that the lady who does will be related to Sir Michael Culme Seymour. The vessel has now been in hand for about nine months, and there is every reason to believe that she will be ready for commission within twenty months from the date of laying down the keel. The arrival of the *Hannibal* from Pembroke will, it is expected, shortly be followed by the *Andromeda* and most of the "*Diadems*." Something like £70,000 remains to be spent on the first-mentioned ship, and Portsmouth apparently has a busy time before it. No delay is expected in the matter of the *Hannibal's* trials, as Messrs. Harland & Wolff's, it is said, have arranged things in some way with the Amalgamated Engineers. She is the last of the nine vessels of the *Majestic* class which were laid down under the Spencer programme. The *Barham* is under orders to be completed by November, but the authorities have asked for the time to be extended to February, as the engineering strike has upset calculations somewhat. The *Porpoise* is to be completed for sea by the 15th of next month. The old gunboat *Pincher* is having a new 6-in. gun and mounting placed on board her for trials by the experimental staff of the *Excellent*, and the old battleship *Resistance* is having her side armour plates removed. These plates will be used later on as backing for the new armour plate testing shields at Whale Island. The vessels of the training squadron, *Active* and *Volage*, have put in here in order to refit for their winter cruise to the Canary Islands or West Indies.

The German Naval Programme.

The campaign which is being conducted in Germany, which has for its object the rousing of patriotic interest in the Navy, does not so far appear to have met with much success. Admiral Tirpitz, who has succeeded Admiral Hollmann as Naval Secretary of State, is the author of the great programme recently cast out by the Reichstag. It is believed that the only object the renaming of the *Ersatz Leipsig* to that of the *Bismarck* had was, to win over the moral support of the Iron Chancellor. But his opinion, as expressed in the *Zukunft*, is that it is a fantastic plan over which the Germans will only get into trouble with other people. In this cruiser the constructors have taken great precautions against the chance of a fire breaking out in action, and in place of wooden decks cork and linoleum are spread over steel. The bulkheading is of steel, as are the deckhouses and ladders. Her character partakes more of that of a battleship than a cruiser, her speed being equal to the *Canopus*, while she is very little heavily armed and has about the same protection. The new ironclad, *Kaiser Wilhelm II.*, at Stettin, a week or so ago, was accompanied by much high-sounding sentiment. She is built of German steel throughout, and displaces 11,050 tons, and her length is 369 ft., beam 65 ft., and draught 25 ft. She is triple screwed, and indicates 13,000 H.P., and her greatest speed is about 18 knots. She is armed with 18 quick-firing guns, which are of about 6 in. calibre, 12 of somewhat smaller calibre, the same number of "revolver" guns, and eight machine guns, besides four torpedo tubes, one above and three below water. Altogether she is a very respectable addition to the German Navy.

The French Navy.

The French Navy is at present pluming itself on the part it has played in the recent visit of the President to Russia, and in the cementing of the Franco-Russian alliance, and has accordingly left others to find that fault with it which is presumably so necessary to efficiency. The defective and slow construction of her war vessels has long been a fruitful theme for discussion, and the incompetence of French designers has also been much talked about. It is to be hoped that the new first-class armoured cruisers which are to be laid down at Toulon will escape the fate of many of their predecessors, and so give French naval men something to pride themselves upon. One of the cruisers, *Dupetit Thouars*, is to be a first-class armoured protected vessel, and is to cost about £800,000. She is to be built entirely of steel, and is to have a length of 460 ft., and 64 ft. 8 in. beam. Her displacement will be 9,500 tons on a load draught of 23 ft. 4 in. She is also to be provided with water-tube boilers of the Normand type, and these with forced draught will give her a speed of 21 knots. She will have triple screws and a H.P. of 19,600. Her armament will consist of two 7 ft. 6 in. guns, eight 6 ft. 4 in. quick-firers, and twenty-two smaller guns and two torpedo tubes. The other vessel, the *Admiral de Gueydon*, which is to be laid down at L'Orient, will be a sister ship in almost every respect. Another cruiser of a similar nature is to be laid down in a private yard, but up to the present the contract has not been given out. The French public mind appears to be in an unformed state upon naval matters, and excellent critics as MM. Lockroy and Cavaignac are, they accomplished very little when they held the naval portfolio.

Premiums to American Shipbuilders.

Some interesting statistics have recently been made in connection with the premium system in the United States shipbuilding yards, which has involved the payment of over three and a quarter million dollars. Secretary of the Navy Whitney first instituted the system that awards for H.P. at the rate of 100 dols. per unit in excess of the contract requirements. Under the system the *Yorktown* earned 39,825 dols., the *Newark* 36,957 dols., the *Concord* 453 dols., the *Bennington* 3,609 dols., and the *Baltimore* 106,442 dols. In all cases there was a penalty of 100 dols. per unit for any shortage in H.P. and under, the *Charleston* lost 33,823 dols., the *Monterey* 32,823 dols., and the *Petrel* 485 dols. Soon, however, it was determined to give premiums for speed, irrespective of H.P., and under this plan the *Wilmington* earned 41,500 dols., the *Bancroft* and the *Machias* 45,000 dols. each, the *Nashville* 45,980 dols., the *Helena* 49,940 dols., the *Castine* and the *Indiana* 50,000 dols. each, the *Philadelphia*, *San Francisco*, and *Massachusetts* 100,000 dols. each, the *Marblehead* 125,000 dols., the *Detroit* 150,000 dols., the *Oregon* 175,000 dols., the *New York* and *Monterey* 200,000 dols. each, the *Iowa* 217,420 dols., the *Olympia* 300,000 dols., the *Columbia* and *Brooklyn* 350,000 dols. each, while the *Minneapolis* broke all records with 414,600 dols. That well-known shipbuilding firm, Cramps, of Philadelphia, in all their contracts never lost a dollar for penalties either in speed or H.P., but earned the great extra sum of 1,865,144 dols. A reaction set in after the tremendous sum above-mentioned was won in this way by the *Minneapolis*, and if the system should be revived it would be on a much smaller scale, but the opinion at present is that no premiums are needed to make American contractors put in their very best work. Time will perhaps show.

Ball & Greer's Patent Steam Trap and Reducing Valve.—In our issue of October, 1896, we gave a detailed description and illustration of the above device, and we understand from Mr. Greer, of 38, Bishopsgate Street Within, London, that a number of testimonials have lately been received from users testifying to the very satisfactory and efficient manner the apparatus works. Among these testimonials, mention may be made of that of Mr. James Pollock, of 22, Billiter Street, London, E.C., referring to the steam trap fitted to the s.s. *Oberon*, and also that of Mr. A. Thomson, of 8, Fenchurch Avenue, London, E.C., who states that with reference to the patent traps fitted to the s.s. *Yarrowonga*, *Warrnambool*, *Warrigal*, and *Bungaree*, they have been and are still doing splendid work, working automatically, saving all the condensed water from the bottom of the water chambers to which they are attached, and passing it down to the air pump chambers, from which the feed-pump suction takes it away. The L. P. cylinders, piston rod, and stuffing-box packing are all much benefited, apart from the fact of saving the water and relieving the evaporators from much of their labour in supplying the loss of pure water which they were subject to before.

Leask's Engineer's Handbook.—We have received a copy of this handbook, which is published by Leask's Marine Academy, of 95, Minories, Tower Hill, London, E. This little book contains the regulations and all necessary information regarding Board of Trade Certificates for second, first, and extra first classes, appointment as engineer surveyors to the Board of Trade and to Lloyd's Register of Shipping, and also specimens of papers given at recent examinations. Besides these, the book contains some very concise and sound advice to to those who are desirous or intend to go up for these examinations, and the book should prove useful to those who have no other means of becoming acquainted with the necessary information on the subject.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from August 25th to September 24th, 1897:—

Ainsworth, Frank S., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, for date September 30th.

Ash, Harold E. H., engineer to the *Ranger*, to date August 27th.

Barter, Frederick, engineer to the *Thunderer*, to date September 13th.

Benn, Edward P. St. J., assistant engineer to the *Rodney*, to date September 22nd.

Bolton, Arthur W., engineer to the *Pigeon*, to date September 21st.

Bowing, John, engineer to the *Cæsar*, to date August 24th.

Burner, William H., fleet engineer to the *Victory*, additional, for the Reserve, to date September 4th.

Carey, J. J., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Carter, Edwin, engineer to the *Pheasant*, to date September 13th.

Chilcott, W. W., inspector of machinery to the *Hibernia*, to date July 30th.

Cock, Alfred E., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Coleman, Arthur W., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Colquhoun, William G., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Croisdale, Louis R., assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Dupen, Arthur P. L., engineer to the *Vivid*, to date August 12th.

Ewart, Arthur E., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Fletcher, Frank A., assistant engineer to the *Pearl*, additional, to date September 30th.

Forbes, John W., (probationary) assistant engineer to the *Cæsar*, to date August 24th.

Fraser, George J., fleet engineer to the *Victory*, additional, for the *Mercury*, to date September 4th.

Garde, Robert B., engineer to the *Speedwell*, to date August 24th.

Gibbs, A. W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Gilbert, J. H., fleet engineer to the *Shannon*, to date September 15th.

Grant, Henry W., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Guyer, Thomas S., engineer to the *Pembroke*, additional, to date September 8th.

Haddock, Sidney G., chief engineer to the *Proserpine*, to date August 24th.

Hall, Arthur C., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Hammond, Leonard, H. P. (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Hart, William, engineer to the *Pearl*, to date September 30th.

Hibbard, John A., engineer to the *Circe*, additional, to date September 8th.

Hine, Arthur E., assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Hobbs, Lionel M., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Kent, Walter J., engineer to the *Thrasher*, to date September 10th.

Kingsnorth, Arthur F., engineer to the *Harrier*, additional, to date September 8th.

Review.

Cassier's Magazine. Marine Number. London, August, 1897.

The marine number of *Cassier's Magazine* contains much matter that will be of interest to our readers. Many well-known writers have contributed to it. Sir William White has the premier place with an article on "Specialities of Warship Design." It is most interesting and instructive, and should be a complete answer to those dangerous persons who, knowing little, but understanding less, cry out for moderate size in British battle-ships. Moderate size may be attainable in foreign battle-ships. It can only be acquired in the warships of the flag that aims at the command of the sea by the sacrifice of every quality which would render them of service in the day of battle. England, with her commerce, can only fight when she is obliged to. But her defence means carrying the war into the enemy's coasts. Thus we must always be prepared to act at great distances from our base, because of the protection which our seaborne and colonial commerce needs. Foreign navies are unlikely to feel this claim. They cannot do so to anything like the same extent as ours. So it comes about that in coal endurance we must be far better supplied than other warships. That, of course, means that the standard of displacement in our Navy must be far higher than in theirs. Then, too, amongst nations who have no Mercantile Marine, and no Navy to speak of, public opinion is not much educated, and people do not see the impossibility of trying to put a quart into a pint pot, nor do they realize the danger of the proceeding. They even think it smart. But some day they will learn that these compromises destroy the whole value of the costly fighting machine.

Various interesting details are published in this article, as, for instance, the fact that in the case of the *Royal Sovereign* battle-ship, and of the *Powerful*, first-class cruiser (both of which vessels were entirely novel craft of the very largest class), the estimated and actual weights agreed, while the actual position of the centre of gravity was, in each case, within two inches of the estimated place. Such a fact is a very great tribute to Sir William White and to those who work with him, for it means that the paper idea of the designer is actually converted into reality by the labours of shipbuilder and engineer. Wisdom is justified of her children, and the vessels we have now are suited to their design. Under former Chief Constructors things were otherwise, and vessels were added to the Navy which, at load draught with their estimated weights on board, drew a couple of feet more than their design. Thus they either did not carry what they needed, or their armour protection and speed were minimised.

We have taken so much space over Sir W. White's paper, that our further notices must be hurried. Mr. Yarrow contributed an interesting discussion on fast torpedo boats, and pays a graceful tribute to the labours, in the common field, of M. Normand and Messrs. Thornycroft. Reference is made to those most interesting circulation experiments which took place at the Isle of Dogs a couple of years ago. Mr. Thornycroft speaks of the construction of shallow draught steamers. Mr. West discusses the problem of steamship design. Amongst other matters he gives a list of the various demands which have to be satisfied in the design of a large passenger liner, altogether outside the machinery department. Most of them are known to our readers, but the catalogue shows how arduous a task it is.

Mr. Purvis discusses the principles affecting a floating ship, and after describing the existing experimental tanks, advocates the establishment of a public one, and answers the objection to which he feels the suggestion may be exposed.

Mr. Archibald Denny and Mr. Morrison tell us each of the work in which he is engaged. Mr. W. M. McFarland, of the United States Navy, gives an interesting and opportune contribution in an illustrated account of the various types of water-tube boiler now before the public.

Englishmen will read with the greatest interest the articles on those special types of steamers which are peculiar to American waters, and on the shipbuilding of the great American lakes. Some of our readers may be surprised to learn that there are cargo boats on these lakes of a length exceeding 400 ft.

Two articles on naval warfare are contributed. One is by Sir Charles Dilke. It is entitled the "Naval Weakness of Great Britain," and it shows, from the point of view of the student of history, and of the competent observer of the

present forces of politics amongst the great nations of the earth, what he conceives to be the weak spots in the harness of our country. He admits the undoubted improvements in the methods of our Admiralty in recent years, but he thinks we are still far from perfect. That may well be, for perfection is impossible. Still, improvement is always desirable, and that can only be reached by fixing a high ideal. This, however, is scarcely, we think, to be found in the disadvantageous comparison of our cruisers with the American-built *Brooklyn* and others.

The last article we can notice is that which Mr. Holland, the American who has most nearly solved the problem of submarine navigation, contributes on the subject, to which he has devoted so much labour and study. He dwells on the discouragement with which those who have sought to solve this problem have met from the authorities, and on the fact that the results of previous experiments have invariably been lost. He, however, has prevented this latter trouble occurring again, for the position to-day is carefully explained and published. He shows how a boat such as he believes he can produce, will revolutionise naval warfare, and (he seems to add) deprive those countries which have powerful navies of their maritime supremacy. It may be that it will be so, but it may also be that it will only alter the conditions of warfare. The discovery of a disease generally puts men on the alert for an antidote. Ships did not carry armour until guns increased in size.

Generally, it may be said that the illustrations are excellent. They are very numerous, and the subjects and situations they represent are interesting and novel. The volume is one which was worth waiting for, and those interested in the problems of marine construction and working should certainly not be without it.

HOAR & BROWN'S HARDWOOD MARKET REPORT, SEPT. 21st, 1897.

Teak.	Logs. Loads.	Planks. Loads.	Blocks. Loads.	Total. Loads.
Stock, Sept. 1st.	10,515	2,259	24	12,798
Landings ..	210	442	—	652
	10,725	2,701	24	13,450
Deliveries ..	537	470	9	1,016
Stock, Sept. 17th.	10,188	2,231	15	12,434

The stock of logs have increased considerably during the past three months, and the teak sheds at the West India Docks are inadequate for the storage of any further arrivals. Indeed, there are now about 1,000 loads piled on the quay waiting for under cover space to be found. The Dock Co. are commencing to build further shed accommodation, which is urgently required.

There is still a very large accumulation of second-class logs, but these arrivals have not in any way interfered with the price of prime shipments.

Deliveries fail to come up to the standard of 1896, and trade may be pronounced slack.

Business in planks has been considerable, and deliveries ought to show well for the month of September. Prices are very firm, and shippers are expecting a further advance.

Mahogany.—African.—The large quantities imported have again caused prices to recede, the last public sale showing a decline of from 5 to 10 per cent.

Honduras.—The long-felt want of fresh stock was plainly demonstrated at last week's sale, where prices were very high, especially for sound and straight wood, and the next cargo offered will also meet with eager purchasers.

Nicaragua.—The demand is good. Stocks are considerably reduced, and prices well maintained.

Tobasco.—The last public sale exhibited an increase in values, and the demand appears to continue strong.

Columbia.—This wood has met with little support, the late buyers not displaying any anxiety to purchase further stock, especially at the increased prices which shippers are asking.

St. Domingo.—Stocks are very light, and inquiries far from numerous. There is little but wood of small dimensions left on hand.

Cuba.—Present high values make business very difficult. Stocks are exceptionally light, and for some time yet there is every probability of prices continuing at a high level.

Panama.—Imports have lately been very light. Good logs are realizing fair prices, but shaky and small wood is not sought after.

Cedar.—Honduras and Mexican are much in demand, and the result of the last sale shows well for the holders. Some Columbo wood has been placed at a low figure, somewhat interfering with holders of other qualities. The box makers are keeping quiet, probably with the hope of reducing values.

Sequoia.—Sales are few. There is no alteration in prices, which remain in retail at about 2s. per foot cube.

Kawrie Pine.—At the usual figure there is a steady demand, although trade in this useful wood does not appear to be increasing much.

American Walnut Logs.—The market is a slow one, and the stock of inferior quality is excessive. Prime wood is scarce.

An improvement in business may be recorded, some large stocks held by the dealers having changed hands during the last month.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE subject of greatest, and of course, of almost engrossing interest, on the part of the shipping and the general public during the month has been the agitation for the eight hours' working day, and the consequent dislocation of all matters concerned directly and, to more or less extent, indirectly with marine engineering. At the time of writing (22nd ult.) both sides to the dispute have nearly exhausted their resources in the way of onslaught and reprisal, and any further development of hostilities—to be effective—would almost seem to mean an entire stoppage of work connected with shipbuilding, engineering, and all branches of industry allied thereto.

In spite, however, of the belligerent spirit rampant, it is really hoped—if not believed—by both sides in this district that the intervention of the Board of Trade, which has been quietly in progress for two days past, may eventually lead to a conference, during which by forbearance, tact, and unbiassed reasoning, a settlement satisfactory on the whole to both sides, at least for some years, may be arrived at.

As matters stand, practically all the districts in which engineering is carried on to any extent have joined forces with the federated employers in marking their sense of the momentousness of the issue started in London, but about the extension of which to other and more important districts nobody has ever had any doubts. On Saturday, the 18th, all the members of the Dundee Employers' Association, with the exception of Messrs. Gourlay Brothers & Co., posted lock-out notices affecting 25 per cent. of their unionist employés in a week's time, and other 25 per cent. a week after, and so on. But for the refusal of Messrs. Gourlay, this step would have been taken earlier by the Dundee, Aberdeen, Leith, and Edinburgh employers.

Rather late in the day several firms in Motherwell and one or two in Glasgow have posted the lock-out notices. The fact is that all sort of pressure has been brought to bear upon firms laggard in throwing in their lot with the Federated employers, and they have been canvassed and reasoned with—not to say cajoled—in a manner characteristic of some great general Parliamentary election.

On the part of the workmen the retaliatory policy has been, where notices have been posted regarding a lock-out of 25 per cent., an immediate stoppage by all unionists in the works. For most past, too, the non-unionists have acted in concert with the unionist and dropped work at once. In not a few instances, however, non-union, and consequently non-pledged men have continued to work on in the face of a state of things, as regards picketing and so-called suasion, which has brought not a few within the long arm of the law. A great demonstration on a large scale takes place in Glasgow on Saturday 25th, at which it is expected some 15,000 men will attend,

including contingents from Greenock, Port-Glasgow, Paisley, Renfrew, Clydebank, Yoker, and Partick.

The shipyards on the upper reaches of the Clyde, Whiteinch, Partick, Govan, &c., are, on the whole, well stocked with work; but one or two exceptions—notably Messrs. A. & J. Inglis, of Pointhouse, and Messrs. D. & W. Henderson, Meadowside—present a painfully bare appearance. Messrs. Robert Napier & Sons, who for a considerable period were extremely slack, have been kept busily employed for some time, and their stocks at present are well occupied with important work in all stages of progress. Their neighbours, Messrs. The London and Glasgow Shipbuilding Co., Limited, are not so favourably situated as regards work in the constructional stage, but one or two large ships are in process of being fitted out. Messrs. Mackie & Thomson, Govan, have some nine or ten vessels on the stocks, mostly of the trawler kind, in the building of which they have become quite specialists.

The Fairfield Shipbuilding Co., Govan, in common with Messrs. Laird Bros., of Birkenhead; Doxford & Son, Sunderland; Palmer, Newcastle; and Thornycroft, London, have received an order from the British Admiralty to supply a torpedo-boat destroyer of 30 knots speed. As many as five such vessels have been ordered—although in the original programme only two were included—on account of progress with existing work not having come up to expectation. The boats are to be 210 ft. 6 in. long, 21 ft. 6in. beam, and 8 ft. 3 in. draught, with a displacement of 300 tons. Although 30 knots are all that is required, some of the firms will seek, like Messrs. Laird and Messrs. Thornycroft, to attain a maximum of 32 knots to 33 knots, and the engine-power to be given to the craft will thus vary from about 5,500 to 6,000 I.H.P. With a further order for five vessels, which may be soon forthcoming, the number of our high-speed torpedo-boat destroyers will have reached the round figure of 100.

The Fairfield establishment continues busily occupied both in the shipyard and the engine departments; while work is also proceeding with the new machine shops, joiners and carpenters shops, &c., necessitated by the disastrous fire at the beginning of the year. On the stocks, the first-class cruiser *Argonaut* is well under way, and the two second-class cruisers *Hermes* and *Highflyer*—which vessels it is interesting to note are Nos. 401 and 402 in the enumeration of Fairfield's productions—are framed to the protective deck and in one case partially framed to the upper deck. The large 7,300-ton Cape Mail steamer for Sir Donald Currie & Co. is almost entirely plated; the framing has been completed of a twin-screw steamer for the Roumanian States Railway, and the keel and centre longitudinal have been laid and the protective shedding erected over the new steam yacht for Baron Edmund de Rothschild.

The new Currie liner will embody in her machinery department some features of interest, mainly concerned with economical propulsion, jointly due to the thoroughness and skill of Mr. List, the superintending engineer of the Castle Packet Co., and of Mr. Gracie, the engineering manager at Fairfield. The engines are to be of the quadruple-expansion type, and are to be worked with a steam pressure of 205 lbs. per square inch. The boilers in which steam at this unusually high pressure will be generated, are the largest and heaviest ever made at Fairfield. They exceed 100 tons in weight, and that, too, notwithstanding that a steel with an unusually high percentage of carbon has been used in their construction, increasing the tensile strength of the material by two tons per square inch over the highest results stipulated for by Lloyd's Register and thus reducing the thickness necessary, which, in this case, is between 1¼ and 1⅜ ins. The engines will indicate between 9,000 and 9,500 I.H.P. They will have four cranks and four cylinders, the high-pressure cylinders being at one end and the second intermediate at the other end. As, by this arrangement, a long steam pipe is required, connecting the two, advantage is taken to steam jacket a portion of the pipe and thus form a re-heater to which automatic drains will be fitted. The engines will be fitted with the Schlick-Yarrow and Tweedy system of balancing the parts and moving forces, to do away entirely with vibration, which system has now been applied to a large number of modern steamers with most gratifying results. Some of the sanitary pumps will be of the independent centrifugal type driven by electric motors, and electric motors will also largely be used on board for driving fans, &c. For removing impurities out of the water before it is pumped into the boilers, a new form of feed-water filter will be provided which has special claims to efficiency.

Fairfield's latest fast paddle-boat, the Isle of Man Channel steamer, *Empress Queen*—of which a view was given in our August issue—has just finished her first season's running. She retires for the winter with a first class record. Probably in the case of a vessel of the size and power of the *Empress Queen* it may take a longer season's running than she has had to bring out thoroughly the pith that is in her, but whether or not there is still greater speed to be obtained, it speaks highly for the skill and care that have been brought to bear on her propulsive machinery that already practically 23 knots have been recorded—a knot and three-quarters in excess of the guarantee—and no part of the machinery has given trouble. The enormous power of the engines, 10,500 I.H.P., and the size and staunchness of the paddle-wheels are features seemingly much better matched than in the vast majority of swift Channel steamers produced within recent years. Her average speed on service has been 22·7 knots, with 42·6 revolutions, and just before retiring she broke the record of her sister ship, the *Prince of Wales*, steaming from the Rock Light to Douglas Head in 2 hours 56 minutes.

Below Fairfield the yards of Linthouse, Whiteinch, and Scotstoun are fairly well stocked with work, an approaching launch of some note being that of the *Dunluce Castle* for the Castle Packet Co.'s Cape fleet, on the stocks at the yard of Messrs. Barclay Curle & Co. Renfrew, Yoker and Clydebank yards are also well employed.

In the lower reaches of the Clyde, Dumbarton, Port-Glasgow, and Greenock, there is on the whole more activity than in the upper reaches, and orders for new tonnage are being booked more freely. Amongst contracts recently fixed are two steel steamers, each capable of carrying 3,000 tons deadweight, to be built by Messrs. Robert Duncan & Co., Port-Glasgow; the machinery for which will be supplied by a Glasgow firm of engineers. Messrs. Murdoch & Murray, of the same port, are to build for Finland owners a steel screw steamer of 700 tons gross register, for passenger and cargo service. Engines on the triple-expansion principle will be supplied by Messrs. Rankine & Blackmore, Greenock.

Messrs. Caird & Co. and Messrs. Scott & Co., the two principal firms in Greenock, are steadily kept in employment. The s.s. *Egypt*, of 8,000, tons just completed by the first-named firm for the Peninsula and Oriental Co., left the Tail of the Bank on the 18th ult. for Southampton, where she duly arrived, and took on a party of ladies and gentlemen and proceeded on a cruise.

The Dundee Shipbuilders' Co., besides having eight vessels, large and small, on hands are engaged constructing a steel floating dock 170 ft. long, to the order of the Roumanian Government, and effecting repairs on the large four-masted barque *Andorinha*. The most recent of the contracts booked by the firm is for two steam trawlers for Grimsby owners, 112 ft. long, 21½ ft. beam, and 12½ ft. deep; fitted with deep wells for conveying live fish to port. The engines are to be of the triple-expansion type, having cylinders 11½ in., 19 in. and 32 in. diameter by 22-in. stroke, and the boilers 11½ ft. by 10½ ft. diameter, working at a pressure of 200 lbs.

Messrs. Gourlay Bros. & Co., Dundee, launched about mid-month a steel screw steamer of 1,140 tons gross, named *Batavier III.*, built for the Nederlandoche Stoomboot Maatschapptj, of Rotterdam, for whom they are also at present fitting out the *Batavier II.*, a sister vessel.

The engineering and shipbuilding firms at Leith have a fairly satisfactory amount of work on hand, repairs forming a large part of it. Messrs. Menzies & Co., who conduct a very large business in repairs as well as the construction of new work, have for some time past been laying down plant and extending their premises in order to overtake engineering as well as shipbuilding, and they are now in a good position to carry out whatever may be required in both departments to vessels entering the port of Leith.

Messrs. Ramage & Ferguson continue to secure orders for large steam yachts, an important class of work for which they are renowned. Early in the month they launched two vessels, not, however, in the line of their speciality. One was a steel screw steamer built to the order of Messrs. George Gibson & Co., for their Leith, Rotterdam and other trades. This vessel, the *Ronan*, is 260 ft. long, 33 ft. 9 in. beam by 18 ft. 9 in depth, moulded, having also full poop, bridge and topgallant forecastle. The model of the ship is designed to make her a specially good sea boat, and her machinery consists of a set of triple-expansion engines having cylinders 21 in., 33 in., and 54 in. diameter by 42-in. stroke, supplied with steam from two

steel boilers of 170 lbs. pressure. All the latest mechanical appliances for efficiency and economical working have been adopted with the view of keeping up a steady sea speed fully equal to any vessel in the trade. The other vessel—if she may be so-called—was a grain elevator built to the order of the London Grain Elevator Co., for use at the Docks in London. This elevator is on the pneumatic system, known as Duckham's patent, by which grain is discharged straight from the holds of steamers into barges, the whole process, even to the weighing, being automatically done, thereby saving a great deal of labour, while the rapidity of discharge is very much greater than by the ordinary methods, being at the rate of 120 tons per hour.

The visit of the Duke and Duchess of York to Glasgow on the 10th ult., to name the Prince's Dock and lay the final copestone of the graving dock, as well as the foundation stone of Glasgow's new Art Galleries, was a great success. The weather was unfortunately not so bright as could have been wished, but there was no rain nor similar drawback. Although the day was not observed as a public holiday, thousands upon thousands of citizens greeted the Royal couple at every point. Elaborate and very perfect arrangements had been made by the Clyde Trust for the ceremony of naming the dock and laying the copestone, and the proceedings were witnessed by thousands of spectators, accommodated on immense grand stands along both sides of the graving dock.

As we purpose fully describing the graving dock, which, in some of its main dimensions, is the largest in the world, and perhaps illustrating it in a future issue, our present reference to it must be brief. The dock itself is now complete; but the pumping and other machinery in connection with it has not yet been completed at the works of the various makers. It will, in all likelihood, be a year yet before the first vessel can be accommodated. Owing to the haze which enshrouded the surroundings on the occasion of the stone-laying, nothing like an adequate view of the immense dock could be obtained. Some idea of it may be conveyed by the fact that when filled to a depth of 28 ft. 6 in. by a spring tide its capacity is about 2,202,000 cubic feet, equal to 13,762,500 gallons, or about 61,500 tons of water. The pumping machinery to be laid down will be the largest installation of such machinery in the world. It has to discharge this immense body of water and empty the dock in two hours. The contractors are Messrs. Andrew Barclay, Sons & Co., Limited, of Kilmarnock. They are to equip the whole of the engine house with its two sets of powerful engines and pumps and all the auxiliary machinery and plant in connection therewith. The steam pressure is to be 110 lbs. and the engines are two pairs of 28-in. cylinders working with high-pressure steam, having double-ported slide valves with expansion valves and the firm's special cut-off gear for economy of fuel. The engines are of the vertical open marine type, very massive, with double-throw balanced crank shafts coupled direct to the shafts of the very large centrifugal pumps. These special pumps are being made for Messrs. Barclay, Sons & Co., by Messrs. Gwynne & Co., Holborn, London. The two pairs of engines are equal to over 3,000 I.H.P. which leaves ample margin. The discharge pipes from the dock to the river are 5 ft. diameter and two in number, and along these the water will flow at the rate of nearly 140 yards per minute. The boilers and boiler-house equipment are being supplied by Messrs. Lindsay, Burnett & Co., Moore Park Boiler Works, Govan, there being four boilers of marine type, complete with fittings and adapted for forced draught when that is required.

For rapid coaling purposes, a large self-propelling steam crane has recently been erected at the south-west corner of the new Prince's Dock, and subjected to a satisfactory official test of dealing with 30 tons. The rails on which the crane travels are laid to a gauge of 24 ft. 9 in. and the carriage is raised sufficiently to admit of the passage of two trains underneath. The jib is 65 ft. long, with a radius of 42 ft. 3 in., and the vertical range of the load is 95 ft. This crane has been designed and built for the Clyde Trustees by Messrs. George Russell & Co., of Motherwell, and the same firm has recently received an order from the Mersey Docks and Harbour Board for a still more powerful, but hydraulically-worked crane, capable of lifting 40 tons. It will travel on rails of 25 ft. gauge, the radius of jib will be variable from 85 ft. to 40 ft. and will be fitted with two pairs of Russell's patent hydraulic engines. The crane is intended to be placed on the south quay of the Canada Graving Dock, Liverpool.

For almost a year past the graving dock at Port-Glasgow has been in disuse owing to extensive leakage at the gates, leading to the provision of new gates entirely. The whole of the past year's revenue, amounting to £2,799 19s. 10d., has been absorbed in meeting the outlays connected with the work of first trying to stop the leaks and eventually of providing new gates. The account amounts in all to £2,866, which is no doubt a considerable sum to part with considering that as a result of the dock not being available for nearly a year, a rental of close upon £1,000 has been lost to the Trust.

Good progress has been made with the construction of the new graving dock at Troon, on the Ayrshire coast, operations, on which were started in January last. The dock, when completed, will be 364 ft. long; depth, from cope, 30 ft. 3 in.; width at bottom, 50 ft.; at top, 86 ft. There will be 22 ft. of water on the sill at high-water of spring tides.

Seeing that Glasgow, its docks, and river, have so recently been figuring in the public eye, through the visit of Royalty to put the finishing touches to the Prince's Docks, it is a fact worthy of note that the Clyde, which has not hitherto been navigated by vessels drawing more than about 26½ ft., was safely negotiated the other day, during one ordinary tide, by a vessel drawing 27 ft. This was the s.s. *Enrique*, belonging to Messrs. Macbeth & Gray, of Glasgow, which, owing to same damage to her tail-shaft and stern tube, had assumed this excessive draught aft. The feeling amongst Clyde pilots, however, is that vessels longer than the *Enrique*, and drawing from 6 in. to 1 ft. more water may be navigated up the 22 or 23 miles of tortuous river with safety and confidence. Glasgow folks may well congratulate themselves on the perspicacity of their "City fathers" who, in 1755, rejected the proposal made by Smeaton the celebrated engineer.

The magistrates and merchants of St. Mungo of that period had sought Smeaton's advice as to the possibility of bringing, their trading vessels up to the Broomilaw instead of unloading them at Port-Glasgow, where a harbour and docks had been formed, as the nearest point practicable. There was only, at that period, 1 ft. 3 in. of water at low tide, and 3 ft. 8 in. at high tide, at a point coincident with the western end of the present harbour. Smeaton recommended the construction of a lock and dam at a ford about four miles below the Broomilaw, to secure, at all times, a depth, right up to the Broomilaw, of 4 ft. 6 in.! The lock was to be, "18 ft. in the clear, and to take in a vessel of 70 ft. long, or to let pass a sloop or brig of above 100 tons, when there is water in the river to admit it." Clearly Smeaton had little idea of Glasgow ever becoming much of a seaport, far less of leviathans like the *Campania*, the *Lucania*, *City of Rome*, and ocean steamers, drawing 27 ft., being accommodated in the Clyde, well within the line of his proposed lock and dam.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—That many shipowners are of a sanguine temperament, is shown by the fact that in spite of the partial stoppage in the engineering trade, which must surely have a restrictive effect on business, they are still preparing to meet requirements which must be expected to arise, by ordering new vessels. The shipbuilders who accept the orders must also look upon the future in no spirit of misgiving; since they take upon themselves the responsibility, not only of building the ships but of providing them with engines, and it is a highly favourable omen that they are not afraid to do so. They evidently believe that the engineering dispute is not going to last for ever, and they also seem to be impressed with the conviction that when a settlement does come, it will be such as to justify the action of the engineering employers in their resistance to the claim of the engineers. On no other hypothesis can their readiness to enter into contracts under existing circumstances, be explained; for if the struggle were to terminate in a victory for the men, prices would probably bound upwards to an extent perhaps which would be prohibitive, and the shipbuilders, who are well aware of this possibility, would be very averse to facing such a situation encumbered by the obligation to provide engines, no matter what the cost. If the men should find themselves strong enough to force compliance with their demand for the concession of an eight-hours' day, they would also think themselves strong enough

to force a large advance of wages, and it is not for a moment to be supposed that any considerations of prudence or equity would restrain them. The probability therefore of a big advance of prices being brought about by the success of the latter in the wild crusade they have set out upon, is no idle speculation, but a contingency certain of occurrence, and if the shipbuilders did not feel convinced that this turn of affairs would be rendered impossible by the defeat of the men, they would be slow indeed to saddle themselves with obligations it might be impossible to fulfil. The orders that have been booked on the Tyne, though not numerous, are important, among them being one for a cargo steamer of 11,000 tons, secured by the Palmer Co., and intended for addition to the fleet of a well-known firm of northern owners. The same firm have also recently booked an order for a 6,000-ton steamer, for the owners of the Hall Line, to whose order a very fine vessel was recently launched at the Jarrow establishment.

The monster pontoon, ordered early in the year from Messrs. C. S. Swan & Hunter, for location at Havana, was launched in the first week of the present month, and a few days later, left the Tyne in tow of a steamer, for the distant port named. The feat of completing so large and complicated a structure in less than six months is something for even a firm of Messrs. Swan & Hunter's standing to be proud of, and would have been impossible of achievement a few years ago. It is indeed only by the aid of the highly effective machinery of modern design, that the firm have put down in the yard reserved for pontoon building, that such rapidity of execution was rendered possible, and we make bold to say that there is no other place in the world where such a piece of work could be done in the time. Not less wonderful than the quick execution of the work, is the rapidity with which the structure was got ready for its hazardous voyage across the Atlantic, so that in little over a week from the time of launching the voyage was commenced. The stability of the structure must be something above the ordinary to withstand the heavy weather likely to be met with before southern latitudes are reached; but it seems to be a foregone conclusion that no damage will be done, and on this score there does not seem to be the slightest misgiving entertained by either owners or builders. The successful carrying out of this important contract cannot fail to add greatly to the fame of the eminent firm to whom it was entrusted, and will doubtless have the effect of bringing further work of the same description to the Tyne.

Another demarcation dispute has arisen at the yards of Messrs. Armstrong, Whitworth & Co., and Messrs. Wigham Richardson & Co., between the shipwrights and other sections of operatives, and much inconvenience has resulted therefrom. It was feared at one time that the dispute would culminate in a general lock-out of shipyard men on the North-East Coast, and at many establishments notices had actually been posted. An arrangement has since been arrived at, however, by which a withdrawal of the notices has taken place, and at the time of writing negotiations are being carried on, by which, it is hoped, a satisfactory settlement will be arrived at. To employers these demarcation disputes are, perhaps, about the most vexatious that occur; for they (the employers) are in no way responsible for them, and are usually powerless to bring them to an end. None the less are they sufferers, for the work is stopped, and they can, neither by concession, persuasion, or entreaty, induce the men to obey orders and do what they were engaged to do. The worst of it is, there seems to be no finality in these disputes, for no sooner is one claim settled than another crops up, and there is scarcely any respite for the employers. The executive council of one of the largest trade unions connected with shipbuilding is now proposing to minimise the evil by extending the principle of federation, and this may possibly prove to some extent effective; but it seems to us that a simpler and still more effective way of dealing with the matter would be for the employers to assert their prerogative, and allow no one but themselves or their representatives to have a voice in the apportionment of work which they have contracted for, and for the execution of which they have to pay.

Messrs. Hawthorn, Leslie & Co. are finishing a number of small river steamers for Russia, and have got the torpedo destroyers, ordered by the Admiralty, well advanced towards completion. The firm have, we understand, decided to adopt the system of "joggle" plating, introduced by Messrs. Doxford, of Sunderland, and have ordered one of Doxford's patent roller press machines, with a view to commence the application of the new method as soon as possible. The "joggling" process seems to be surely, if somewhat slowly, making its way; and this is not to be wondered at, considering that it enables packing to be entirely dispensed with, besides permitting of the use of shorter rivets in the framework, and imparting to the plates, and to the whole structure, an undoubted addition of strength, without any increase—but rather, with a very substantial lessening—of total weight. From the first we have expressed the opinion that the system of "joggle" plating was bound it secure general adoption in time, and we are now inclined to the belief that the time is not so far distant as a year or two ago to was supposed to be. The introduction of improved methods in England is one of the means by which foreign competition can be shorn of its power to injure, and as all English builders desire to keep the work at home, and as much as possible for themselves, we feel convinced that they will not much longer leave the advantage of the undoubted improvement referred to in the exclusive possession of the few firms who have, up to the present, adopted it.

Last month we referred to the proposed incorporation of the "National Society of Drillers" in the Society of Boilermakers and Iron Shipbuilders, and now we have to add the information that three other societies of drillers, hailing respectively from the Wear, Tees, and Thames, have applied to the Boilermakers' Society for admission to the latter body on the same terms as the "National Drillers." The Liverpool branches of the boilermakers, however, have, by way of circular, protested against the admission of any societies of drillers, on the ground that the latter are only labourers, and as such, unworthy to become affiliated with "the greatest union of mechanics in the world at the present day." Thos circular boldly condemns the Executive Council for their "inconsistency" in recommending the drillers for admission, after having, on a former occasion, helped to keep them out of the Federation of Shipbuilding Trades, because they were "labourers." The result of the voting on this question (the admission of the drillers) will be made known in the October report of the Boilermakers' Society, and will be looked forward to with much interest by others, besides those immediately concerned.

The large steel pontoon dock belonging to the Smith's Dock Co., North Shields, was, a few days since, raised for examination of the immersed portion, this being the first time of such an examination being undertaken since it was placed in position some five or six years ago. The bottom and all parts below water were found in a singularly clean and sound condition, this satisfactory result being attributable to the fact, that before immersion the parts were coated with "bitumastic enamel," manufactured by Messrs. Wailes, Dove & Co., of St. Nicholas's, Buildings, Newcastle, which covering protected them most effectively from corrosion and fouling. This is strong testimony to the value of "bitumastic enamel" as a protective covering and considering the time the parts were under water, the result is one that, perhaps, has never been equalled in this particular category of experiments. Wailes, Dove & Co. at present have several large orders in hand and are coating with their "bitumastic" enamels seven cruisers, including two for the British Admiralty, two for the Japanese Government, one for the Chinese, and are just completing two for the Norwegian Government. They have also lately received orders to coat two large "Hamburg-American" liners, one at Hamburg and one at Geestermunde, one new "Castle" liner at Fairfield, and they have just completed two large steam yachts for R. and the late Ogden Geolet, Esqs., at Clydebank, one steam yacht for T. Pim, Esq., at Leith, besides many other vessels on the North-East Coast, the Clyde, and the Thames for the Mercantile Marine.

Engineering.—Notwithstanding the great difficulties under which the engineering employers labour, in consequence of the eight-hours dispute, the output from the works during the first weeks of the strike, at all events, does not appear to have fallen so far below the normal rate as might be imagined. Comparing the accounts of trial trips, as recorded in the MARINE ENGINEER, during the period between July 1st and August 20th, 1896, with those recorded during the same period in the present year, we find the decrease to be less than one-eight in tonnage, though in the number of vessels a larger falling off is shown. Taking the centres of the Tyne, Wear, Tees, and Hartlepools, the record shows that in the period referred to, twenty-one vessels of an approximate aggregate tonnage of 83,800 tons were sent on their trials in 1896, while in the same period of the current year the vessels tried were fifteen, and their approximate

aggregate tonnage 72,600 tons, showing a decrease of six vessels and 11,200 tons, as against the latter period.

From this it would appear that the exertions of the officials and the apprentices in the works—combined in some instances with those of non-unionists—have been far from ineffective, and though as time goes on, the decrease of output must inevitably become more marked, yet, in view of the facts cited, it must be admitted that the state of matters in the engineering trade is not so bad as to be truthfully called a "deadlock." That the contracts in hand are progressing much more slowly than could be wished, however, is a matter of common knowledge; but in a case like the present, customers will doubtless prove indulgent, the object for which the master engineers are now contending, being one with which all employers of labour—with one or two eccentric exceptions—must necessarily sympathise. It may be taken for granted that the engineering employers will not be greatly worried by importunities of customers for delivery, seeing that their resources are for the time being limited, and that they are anxious to do the best they can for all. Apart from this aspect of the case, however, they have enough to trouble them in the spectacle of a large portion of their costly machinery standing idle, together with their inability to enter freely into negotiations for new contracts, and the inroads made on their time by attendances at meetings, &c. There is not, however, the slightest sign of wavering among them, and every indication points to the conclusion that were the losses multiplied a hundred-fold, they would still remain firm in their resolution not to allow any infraction of the present working hours.

In the smaller engineering works, business is still pretty good, but in forges, foundries, and brass works, signs of slackness are beginning to be noticeable.

THE WEAR.

Shipbuilding.—The information has reached us, and it appears to be well founded, that the Sunderland Shipbuilding Co. have booked an order for three steamers of a superior class, and that they have also secured other work of an important character. Messrs. J. L. Thompson & Sons are reported to have booked an order recently, and it is certain that they have a large amount of work in hand. Messrs. Austin & Sons have three boats on the stocks, and are very busy in the repairing department. Messrs. Bartram & Sons, and Messrs. Blumer, are both fairly well off for work, and at Messrs. Robert Thompson & Son's the building berths are fully occupied with vessels of a large class. The latter firm are now engaged in making an important new departure at their Bridge Dockyard, by putting down very powerful new pumping plant to be driven by electric motors. This, we believe, is the first instance in which electricity has been applied to the pumping out of graving docks, and we trust the experiment will meet with full success. The electrical installation at the Bridge Dockyard will also include motors for driving the machinery in the fitters' and joiners' shops, and it is highly probable that the system will subsequently be extended to other departments. The improvements indicated will, it is to be hoped, result in an accession of business to the dock, by which other local interests besides that of the firm will, of course, be benefited. Messrs. Doxford are understood to have received an order for other five steamers from the owners of the "Clan" line, for whom they have already built four large "turret" ships. This is a very satisfactory testimony to the merits of the "turret" design, and it is by no means the first instance in which owners who have had "turret" ships from Messrs. Doxford have given "repeat" orders. Messrs. Short Brothers, and Messrs. Priestman, have both booked orders lately, and Messrs. Pickersgill have also secured some work. It is assumed that in all cases where orders have been booked within the past couple of months, abundant time has been allowed for delivery, and there is little reason to doubt that the assumption is correct. Sir James Laing's yards continue to be quite busy, notwithstanding the inevitable delays involved in getting the machinery fitted in ships put into the water. A second "roller press" machine has, we understand, been recently added to the plant.

Engineering.—There is practically nothing that is new to state in reference to the condition of affairs at the larger engineering works; but one of the smaller establishments has received an accession of work, that will keep the machinery going briskly for months to come, and will probably necessitate an increase of the working staff. Non-federated engineering firms are just now being importuned with enquiries for quotations in respect of triple and compound engines of a small type; but manufacturers are indisposed to close unless exceptionally good terms are offered, and the prospective customers are willing to accept a promise for delivery at the "earliest moment possible," instead of by a stipulated date. The Sunderland Forge and Engineering Co. continue to have a fair amount of work in hand, and at the neighbouring establishment of Messrs. John Lynn & Co. business is pretty brisk. The various specialities manufactured at the Bloomfield Engine Works (Mr. A. A. Rickaby's) continue to be in good demand, and the works are kept in steady operation.

The Hartlepools.—The three yards of Sir William Gray & Co., have been closed owing to the continuance of the engineering dispute, and it is expected that work will also be suspended at the establishments of Messrs. Furness, Withy & Co., and Messrs. Irvine & Co. A large number of men will thus be thrown out of employment, and business people at this centre must consequently suffer very acutely. It is, to some extent, an amelioration of the difficulty that trade at the docks is very brisk; but the requirements here will be far from absorbing the whole of the unemployed labour, and many men will have to leave the district, if they are not in a position to wait till the shipyards reopen.

Stockton.—Though work is, up to the present, fairly plentiful among shipbuilding firms at this centre, there does not seem to be much of a disposition to push on with it very briskly, and at one establishment the frame turners have been suspended. At an engineering works where the boilermaking department was kept going night and day, the night shift has been discontinued, and the operatives are now only employed half-time, each set of men getting alternate weeks. Steel plate manufacturers are beginning to feel the effects of increasing slackness in shipyards and boiler shops, and specifications are coming in slowly.

Middlesbro'.—The shipbuilding establishments at this centre, though not entirely unaffected by the engineering dispute, are still showing a comparatively high degree of briskness, repair work entering largely into the volume of business. Engineering establishments that are not exclusively engaged in marine work are doing tolerably well, and at the steel works and foundries, business is moderately good. At the docks considerable activity is to be noticed.

Darlington.—The Darlington Forge Works continue to be well supplied with orders, in both the forging and steel founding departments.

Consett.—At the Consett Iron Co.'s Works, no appreciable lessening of activity is yet to be seen; but it is felt that the existing briskness cannot be maintained much longer, unless business in the shipbuilding and engineering trades resumes its normal course.

THE MERSEY.

(From our own Correspondent.)

BOTH the marine and other branches of engineering throughout this district continue to be more or less affected by the dispute now going on nominally over the eight hours' question. With few exceptions, the important works connected with marine engineering and the shipbuilding yards in this district are involved in the present lock-out and strike, and so far as the employers are concerned, there is no intention whatever to give way to the demands put forward by the trade-union organisations. Some attempts at outside intervention have been made, but these have not in any way tended to bring the dispute nearer a termination, and the struggle seems now to have settled down into a trial of strength between the employers and the trade-union organisations. There are, however, indications that the trade-union representatives would be very willing to accept any proposals which might bring about a settlement without absolute and entire submission on the part of the men, and a further indication of weakness is an extraordinary circular issued by the Steam Engine Makers' Society, which may be regarded as an indication that this important organisation is contemplating withdrawal from further co-operation with the Amalgamated Society of Engineers in the present struggle. Serious complaints are made by employers in this district with regard to the organised system of intimidation that is now being pursued outside the works of many of the federated engineering establishments. There would be no difficulty in getting in non-union labour, as the higher wages paid in Manchester would afford a sufficient inducement for

men to come in from outside districts, but the present condition of affairs—with threatening crowds surrounding the shop doors, when the workmen are leaving—has deterred the employers from availing themselve of this outside labour. The position, however, is becoming so intolerable that the matter has been taken into consideration by the local branch of the Employers' Federation, and representations are being made to the local authorities and also to the Home Secretary, with a view of securing more adequate police protection for men who are willing to work, but who are deterred by the terrorism of the strikers and their sympathisers.

In this immediate district no addition to the list of firms locking out has been officially announced excepting that of Messrs. Vaughan & Sons, crane and pulley manufacturers, of Gorton, Manchester, but negotiations are going on in some of the smaller centres which may shortly result in a further extension of the lock-out. So far as operations at the local works are concerned, these are for the most part simply kept going in some special departments, and are rapidly getting into the position that these will shortly have to be stopped, the intimidation practised by the men on strike, already referred to preventing employers from bringing in non-union labour to any very large extent. Establishments that have not joined in the lock-out, and branches of industry, such as boiler-making, which are only partially affected, are generally kept fully going. The strike is, however, having a serious effect upon the trade outlook, and in many cases orders that would otherwise be placed with local firms are being given to American and Continental competitors, who are thus securing a footing from which they may not be easily driven when the dispute is over.

With regard to the workmen's position, the local trade-union officials report that there is no material change to record in the number of members on the books on account of the lock-out and strike. In the Manchester district the Amalgamated Society of Engineers is granting support to about 3,000 men, including about 2,400 members, 300 non-society men, and 300 apprentices, whilst it is also granting 1s. per head to 3,000 children under 14 years of age, representing an expenditure of £2,200 per week on strike pay alone. The total number of men receiving support from all the trade-union societies in the Manchester district is about 4,000. Subscriptions from outside quarters towards the strike funds of the various societies are reported to be coming in satisfactorily, but there are rumours that at least one of the societies has practically exhausted its funds.

The effect upon the societies generally can be gathered from the usual monthly reports issued by the trade unions. The returns of the Amalgamated Society of Engineers show that there are nearly 24 per cent. of the members on strike support. The United Machine Workers' Association have over 40 per cent. of the membership receiving benefit, and the Steam Engine Makers' Society 20 per cent. In the report of the Amalgamated Society of Engineers it is mentioned that 218 firms in the London district had conceded the eight-hours day, as compared with 193 recorded in the previous month's returns, but a number of these are now reverting to the nine-hours day.

At the beginning of the month, Mr. Joseph Adamson, of Messrs. Joseph Adamson & Sons, boiler-makers, Hyde, and Mr. Henry Webb, J.P., of the Irwell Forge, Bury, sailed for the United States, their object being to make a tour of inspection through the large American iron and engineering establishments with a view of picking up any new ideas which might assist them in the development of their works.

Messrs. W. H. Bailey & Co., Limited, Albion Works, Salford, have introduced an improved independent air pump which they are supplying for marine purposes, and which is now in use on the United States warships *Bancroft* and *Chicago*. This consists of two single-acting air pumps driven by one double-acting steam cylinder or fitted with compound cylinders where greater economy is required. We hope to give an illustrated notice of this pump in our next issue. Another improved design is a treble ram pumping engine for boiler feeding and general purposes. In this pump any one of the rams may be thrown out of action without interfering with the working of the others, so that one, two, or three rams may be acting at once to suit the moment's requirements. Messrs. Bailey have supplied several of these pumps to H.M. Government War Department, for the Woolwich and other arsenals, and are making them largely for electric lighting requirements; the orders in hand, including a large size pump of this class for the River Plate Electric Lighting Co., Argentina.

Mr. J. K. Broadbent, of Salford, Manchester, is bringing out an improved arrangement in connection with steam boilers, by which a considerable economy in fuel consumption is effected. This apparatus, which is called Broadbent's patent calorifere, consists of an open-topped recessed chamber at the back end of the grate, and is constructed of fire-brick, with its top front edge about even with the grate level. It occupies the whole width of the furnace and has its back wall formed by the fire bridge. All substances which fail to be consumed or drop into the ashpit are worked forwards from the grate into the chamber where they may be wholly or partially removed at suitable periods. A fire-brick arch is erected over the whole width of the above chamber and in contact with the boiler flue, which it tends to protect at the point where the heat of combustion is fiercest. By the above arrangement all the products of combustion are made to pass through incandescent brickwork at the back end of the furnace, and become thoroughly heated, ignited, and burned in the iron flues. The high temperature necessary to burn the gases is supplied and maintained by Mr. Broadbent's arrangement. The apparatus increases the heating surface from 20 to 25 degrees, thus affording a very effective means of burning cheap fuel and extracting as much heat as possible from a better and higher priced coal, and as it gives an increase of 20 per cent. in the time allowed for combustion the coal is thoroughly burned, and the heat well distributed throughout the boiler, whilst there is no injury to plates or leakage, such as is often experienced with forced draught. The operation of firing can be performed in quarter the time and with quarter the trouble required in the old system.

The iron market during the past month has maintained a strong tone, notwithstanding the continued and extending engineering trades lock-out and strike. There has been no great weight of business doing, but prices for pig-iron have shown a strong upward move, representing in most brands an advance of 6d. to 1s. per ton. Local makers have made no change in their quotations, but are firm at 46s. for forge to 48s. 6d. for foundry, net cash, delivered Manchester. Lincolnshire makers have advanced their rates 6d. on forge and 1s. on foundry qualities, the average quotations being now 43s. for forge, and 45s. 6d. for foundry, net cash, whilst Derbyshire foundry has also stiffened up, ranging according to brand from 46s. 6d. up to 47s. 6d. net, delivered Manchester. In Middlesbrough iron there has been an advance of about 6d. per ton, good foundry brands being quoted 50s. 4d., as the minimum for delivery by rail Manchester, with ordinary G.M.B.'s scarcely obtainable much under this figure. Scotch iron is not so strong as Middlesbrough, but is fairly steady at late rates, Glengarnock averaging 46s. 6d. and Eglinton 46s. 9d. net prompt cash, delivered Lancashire ports, and 48s. 9d. to 49s. respectively, delivered Manchester Docks. With regard to American pig-iron the imports will probably be only moderate during the next few weeks, but before the close of the season it is expected they will be on quite as large a scale as last year, as not only will cargoes be brought over as usual in cotton ships, but the grain vessels will probably bring over pig-iron at ballast rates. Ordinary brands are generally quoted about 45s. 6d., but some high grade qualities suitable for special foundry work average quite 2s. to 3s. more, net cash, delivered Manchester Docks.

The position of the finished-iron trade is without material change. Inland requirements continue limited, but there is a fairly brisk demand on shipping accounts, which enables makers to hold their list quotations. Lancashire bars are still quoted £5 15s., with North Staffordshire qualities ranging from £5 17s. 6d. to £6 2s. 6d.; sheets average £6 17s. 6d. to £7 5s., according to quality, and hoops remain at the association list rates of £6 10s. for random to £6 15s. for special cut lengths delivered Manchester district, with 2s. 6d. less for shipment.

The steel trade continues dull, with a weak tone in prices: ordinary foundry hematites are now readily obtainable at £2 16s. 6d. less 2½, with local billets £4 6s. net cash; bars £6 to £6 2s. 6d.; common plates £5 12s. 6d.; and boiler plates £6 2s. 6d., delivered in this district.

In the metal market only a limited demand comes forward, the stoppage of engineering works necessarily restricting requirements, but list rates are without alteration, and for delivery Manchester district remain as under:—Solid drawn brass boiler tubes, 7½d; condenser tubes, 8½d.; copper tubes, 8½d.; brazed copper gas and steam tubes, 8½d.; brazed brass tubes, 7½d.; rolled brass, 5½d.; brass wire, 6d. to 6½d.; copper wire, 7d. per lb.

Business in the timber trade has for the most part been unsatisfactory. Imports have been in excess of requirements, and stocks are too heavy, with prices for some articles lower. There has been more inquiry for teak logs and planks, but with supplies ample prices are not more than firm at late rates. In greenheart a considerable business has been done, and the demand, especially for piling timber, has been active.

In the coal trade an increased business is reported for house-fire qualities, and pits are now kept going four to five days per week. With regard to prices, list rates for house coals are without quotable change, but there has been a levelling up to the full basis where special low figures have been taken during the summer. At the pit-mouth best Wigan Arley is quoted 10s. to 10s. 3d.; Pemberton four foot and seconds Arley, 8s. 6d. to 9s.; and common house coal 7s. to 7s. 6d. per ton. For steam and forge coals there is only a moderate demand, the stoppage of engineering works necessarily lessening requirements, and although surplus supplies have to some extent been taken off the market by the increased demand for domestic purposes, they are still plentiful, and prices are barely steady at late rates, averaging about 6s. for ordinary steam and forge descriptions at the pit-mouth. Engine fuel is not moving away quite so freely. Supplies are not excessive, but they are quite equal to requirements, with prices about as last quoted, common slack averaging 3s. to 3s. 6d.; medium, 3s. 9d. to 4s. 3d., and best qualities 4s. 6d. to 4s. 9d. at the pit-mouth.

A fair business is doing for shipment, with steam coal averaging 7s. 6d. to 7s. 9d., delivered Mersey Ports or Partington tips Ship Canal, and 8s. to 8s. 3d. delivered Manchester Docks.

BELFAST TRADE NOTES.

(From our own Correspondent.)

NO new points of interest in connection with the engineers' lock-out have manifested themselves during the past month. The dispute still drags on its weary length, bringing on its train its inevitable attendants, want and misery, not only to those actually engaged in the dispute, but also to innumerable others, who have had to be dispensed with owing to the general derangement of business. Owing to Messrs. Harland & Wolff's abstention from joining the Federation, however, a large number who would otherwise have been unemployed have managed to get work here; in fact, this firm are taking on as many hands as they can possibly find room for. At present the unemployed engineers seem to be wholly occupied in organising a public demonstration to bring their claims more prominently before the public and enlist practical sympathy from other trades. Money is being received from several societies to support the engineers, but as time goes on these societies are constantly having more members thrown on idle benefit, which militates severely against any very large subscriptions being voted. Meanwhile, Messrs. Workman, Clark & Co. have three large vessels still lying awaiting machinery.

Readers of this paper will perhaps excuse me mentioning the great social event of this month in Belfast, viz., the visit of the Duke and Duchess of York. Their Royal Highnesses, after receiving numerous addresses of welcome from various public bodies, paid a visit to the extensive engineering and shipbuilding establishment on the Queen's Island, the various departments of which were explained to them by the Right Honourable W. J. Pirrie, Lord Mayor, and head of the firm. On entering the engine works the first objects of interest were the powerful twin-screw engines of the new Union steamer *Briton*, which had just been completed previous to their visit.

From these a tour was next made through the boiler department, then across the road and through the lately completed offices of the shipyard. On leaving the yard the road pursued lay just alongside the slip of the new greyhound *Oceanic*, which was distinguished by a tasteful notice giving the name and length (705 ft.) of the new leviathan.

After embarking at the Victoria Wharf on board a specially chartered and gaily decorated steamer, the party proceeded to open the new "York Dock," and were afterwards entertained to luncheon at the Harbour Office.

To facilitate the work of constructing the *Oceanic* a very large and most completely equipped gantry has been erected across the ship. This can be run the whole length and is supplied by numerous hydraulic cranes to lift the heavy plates and beams, and also to carry hydraulic riveters, &c.

During the month Messrs. Harland & Wolff, Limited, launched the large steel screw steamer *Winifred* from the Queen's Island. The new vessel, which has been built to the order of Messrs. Frederick Leyland & Co., Limited, of Liverpool, is 481 ft. 6 in. long by 52 ft. beam, and has a gross tonnage of 7,000 tons. She will have four masts schooner-rigged, powerful steam winches, and all the most modern appliances for working ship and cargo, as well as a complete installation of electric light. The machinery for the vessel will consist of a set of triple-expansion engines of the latest design, constructed by the builders in the Abercorn Basin.

There has also arrived in this port the s.s. *Athos*, to have engines tripled by Messrs. McColl & Co., Limited; the boiler and funnel having been supplied and fitted prior to the vessel's arrival here by Messrs. D. Rollo & Sons, Liverpool.

The repairs to the s.s. *Arcadia*, of the Hamburg-American line are proceeding as rapidly as the nature of the work will permit; these it seems are rather more extensive than at first thought, a large number of the bottom plates and frames forward having been seriously damaged.

Messrs. Harland & Wolff, Limited, have also recently dispatched the s.s. *Imani* to Glasgow to receive machinery at the hands of Messrs. Muir & Houston, engineers, Kinning Park, Glasgow. The contract for this work had to be sublet on account of the large amount of work in hand; this statement will be borne out when the fact is mentioned that at present three other steamers of exceptionally large tonnage await machinery, while a fourth will shortly be put in the water.

It will thus be seen that the shipbuilding and engineering prospects of Belfast augur well for the future, and were this unfortunate dispute only settled they would be bright indeed. As an indication of the ever-increasing prosperity of the town it is worthy of mention that all the railway stations are at present being largely extended for the accommodation of goods and passenger traffic.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow-in-Furness.—The shipbuilding trade of this district shows no change, and builders have not booked any new orders. As a matter of fact they are not on the look-out for new business, and they are allowing orders to pass them because of the general uncertainty of deliveries so long as the engineers' difficulty remains unsettled. There is no doubt, however, when the settlement is arrived at there will be plenty of work for local builders. At present they are not badly off, having in hand in the case of Messrs. Vickers, Son & Co., at Barrow, a battleship, two first-class cruisers, and four torpedo-boat destroyers for the Admiralty, a 7,000-ton telegraph cable-laying steamer, two Clan Line turret ships of 7,000 tons each, and a twin-screw high-speed channel steamer for the Fleetwood and Belfast service. Of course a yard as big as that at Barrow could conveniently undertake three times as much work, as there is room for something like twenty big vessels on the slipways at one time. The yard has never been fully employed except when the *City of Rome* was building, along with a large number of other ships at that time, and in more recent years when the three *Empresses* were building for the Canadian Pacific Railway Co., and three third-class cruisers for the Admiralty. Now that Messrs. Vickers have got possession of the yard it is evident that brisk times in the shipbuilding trade of Barrow will be again experienced, as it is their intention to do a big business in warship construction as well as to secure a large share of the commercial work which from time to time comes into the market. It is certain that before long new orders will be placed at Barrow, the preliminaries of which are at present the subject of negotiation, and the sooner the engineers' difficulty is at an end the sooner will this new business become a concrete fact. It is a serious handicap on the new owners of the Barrow yard, that immediately after they gain possession of it this difficulty with the engineers should have arisen, although as a matter of fact work in the engineering department was at the time of the commencement of the strike somewhat slack. Since then important contracts have been booked which include not only the engines for H.M.S. *Vengeance* but three other steamers of 7,000 tons each. Further than this, the work of tripling the s.s. *Clan Mackenzie* is in hand and this ship has already arrived to undergo repairs. Only the

foremen and the apprentices are at work, and much of their time is taken up in the steam trials of torpedo-boat destroyers. Two of these, the *Otter* and the *Avon*, have been sent to the Clyde for this purpose, and it has already been ascertained that they can easily cover the 30 knots per hour which is their contract speed. When they have passed through their trials the *Bittern* and the *Leopard* will be ready to undergo their trials, and soon after that the first-class cruiser *Niobe* will be completed and ready for trials. She is now waiting for the engineers. Her engines have been put in the ship, but the connections with the boilers have not been made, nor are all the boilers quite ready to be put in their places. Very successful shore tests have been made with these boilers, and it is confidently anticipated when they come to be tested on the ship they will give even greater satisfaction than those of the *Powerful*, which, though eminently successful, have been greatly improved upon as a result of recent experiences. It had been the intention of the builders to launch the first-class cruiser *Amphitrite* this year, but as her engines are behind the launch will not take place till early next year, when it is expected the *Niobe* will be away. Besides the *Clan Mackenzie* two other Clan liners are expected at Barrow to be tripled during the winter months, so that work in the engineering department is likely to be very brisk when the men return to do it. The engineers' difficulty is prejudicially affecting the shipbuilding trade generally, and if it continues much longer will bring the whole trade to a standstill. Already in some of the departments work is beginning to fall off, although orders are plentiful, and men are being stopped because they cannot get on any further owing to the engineers' dispute.

West Cumberland.—The trade in West Cumberland is fairly steady, and shipbuilders are well employed on ships of small tonnage and of different types. The trade, however, does not represent a big business, but it has the merit of being steady, regular, and profitable. The death is announced of Mr. John Ritson, the senior partner in the firm of Messrs. Ritson, shipbuilders, Maryport. He had a seizure in the shipyard on the 14th of September, and died on the following day at his residence, Ellenbank. He was a shrewd and careful man of business, and made a success of shipbuilding on modest lines at Maryport.

Shipbuilding Material.—The demand for steel shipbuilding material, which had been very good up to the beginning of August, has since fallen off somewhat, owing to the engineers' difficulty, and the fact that much of the material on order will not be required for some time to come. Heavy plates are at about £5 per ton. There is a fair trade in sections and in heavy steel castings. The mills at Barrow, which it was reported had to come to a standstill, are still at work, but it is not known how long they will be kept on. It is hoped that no stoppage will be necessary, for two reasons—first, because the existence of these mills is a powerful lever in the hands of local shipbuilders, and helps them to secure cheaper deliveries than would be possible were there no competing mills in the town, and, secondly, the stoppage of the Siemens-Martin's department of the local steel works would mean a serious blow to the trade of Barrow.

The Hematite Trade.—There is a much steadier and firmer tone in the hematite pig-iron trade of this district, and a good volume of business has been done recently in Bessemer descriptions. Swelters are very fully sold forward and have put an additional furnace in blast, having now 39 blowing as compared with 36 in the corresponding week of last year. There has been a further reduction in warrant stocks which now stand at 201,043 tons, or 94,903 tons less than at the beginning of the year.

Shipping.—The shipping trade at West Coast ports is steadily employed. The exports of metal this year up to date represents 315,928 tons of pig-iron and 333,933 tons of steel, as compared with 238,595 tons of pig-iron and 365,703 tons of steel in the corresponding period of last year, an increase of 77,333 tons of pig-iron, and a decrease of 31,770 tons of steel.

"Nomos Composition."—We have received from Messrs. R. T. Bruce & Co., of 5, Commercial Road, Hull, two of their recent supplementary lists, giving the names of a large number of vessels coated by them during the last few months, the majority of which belong to well-known and representative owners, trading to all the different parts of the world. From the lists we notice that the greater number of the vessels mentioned have been coated previously with "Nomos." In many cases, the owners have used this composition for years past.

BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

July 24th, 1897.

Aburrow, A. E.	2C	London
Allan, D. J.	2C	Glasgow
Allen, W. C.	2C	Hull
Anderson, C. H.	2C	W.H'pool
Bates, G.	2C	Cardiff
Black, G. L.	2C	Aberdeen
Brandie, W.	1C	,,
Broome, E. R.	1C	London
Brown, J.	2C	S'nd'land
Bushby, J. A.	2C	London
Carr, T. R.	1C	S'nd'land
Conlin, J.	2C	,,
Corran, W. S.	2C	Liverpool
Crosby, D.	2C	S'nd'land
Cusworth, G. H.	2C	Cardiff
Duff, W. A.	2C	W.H'pool
Duns, J. H.	2C	N.Shields
Emrey, A.	1C	,,
Evans, C. J.	2C	London
Fiddes, H. R.	2C	W.H'pool
Fisher, T.	2C	Glasgow
Gay, J. M.	1C	N.Shields
Gourlay, R. J.	1C	Glasgow
Gray, J. R. McL.	1C	,,
Hamilton, T.	1C	,,
Hardie, A. R. B.	2C	,,
Hewgill, G. R.	2C	N.Shields
Holmes, T. F.	1C	London
Huddleston, G.	1C	N.Shields
Hunter, J. R.	1C	,,
Jolley, H.	1C	Cardiff
Jones, G. D.	2C	,,
Jones, S.	1C	,,
Legg, T. E.	2C	London
Leng, P. D.	2C	W.H'pool
Marsh, P. H.	2C	Glasgow
McArthur, J.	1C	London
McGregor, R.	2C	Glasgow
Milne, W. S.	1C	Aberdeen
Murchison, C.	1C	London
Naysmith, J.	2C	Glasgow
Nott, F. H.	1C	London
Race, H.	2C	Hull
Readhead, A. F.	2C	W.H'pool
Robbie, W. Q.	2C	Glasgow
Shepherd, D.	2C	Aberdeen
Shepherd, R. D.	2C	Glasgow
Sutherland, J.W.	1C	Cardiff
Suttie, G.	2C	Aberdeen
Tait, J.	2C	N.Shields
Thomas, T.	2C	Cardiff
Thompson, C.H.	1C	W.H'pool
Turner, W.	1C	London
Wallace, R. C.	1C	Aberdeen
Watson, J.	1C	Hull
Watt, T.	1C	W.H'pool
Wearin, F. W.	2C	S'ham'ton
Wheater, F. O.	1C	N.Shields
Whyte, A.	2C	W.H'pool
Wood, C. G.	2C	Liverpool

July 31st, 1897.

Cameron, G. H.	2C	London
Cameron, J.	1C	Liverpool
Hudson, W.M'C.	1C	London
Jackson, R. E.	1C	N.Shields
Lumley, G.	2C	,,
Molley, G.	2C	Liverpool
Morphey, C. G.	2C	N.Shields
Morton, W. L.	2C	Liverpool
Roberts, D. J.	2C	,,
Roberts, J. O.	1C	,,
Rogi, R.	2C	,,
Stabourne, W.J.	2C	London
Stuart, C.	1C	N.Shields
Stubbs, M. C.	2C	Liverpool
Villacian, Z.	2C	Liverpool
Watson, Alex.	2C	London
Whittingham, G.	2C	N.Shields
Wilson, W.	1C	,,

August, 7th, 1897.

Adam, J. H.	2C	Glasgow
Allam, A. W.	1C	London
Atkinson, W. L.	1C	Liverpool
Banks, H. H.	1C	Cardiff
Barrett, W. J.	1C	London
Brazendale, W.	2C	Liverpool
Bull, P. A.	2C	London
Burnett, A. P.	1C	,,
Cooper, R. W.	2C	N.Shields
Davison, W. H.	2C	,,
Dibb, W. J.	1C	London
Ellis, L.	2C	Cardiff
Gillies, K.	1C	Glasgow
Grievis, G. E.	2C	London
Hardie, A. E.	1C	N.Shields
Hardie, D.	2C	Glasgow
Harrison, C. N.	2C	N.Shields
Harvey, F.	1C	London
Hill, J. N.	2C	Glasgow
Hood, J.	2C	,,
Joell, R. R.	1C	N.Shields
Johnson, A. A.	2C	Cardiff
Jones, S. A.	2C	Liverpool
Jones, T.	2C	N.Shields
Kelly, A.	1C	Cardiff
Kelly, A. H.	1C	London
Laing, A. G.	2C	N.Shields
Macdonald, J.	1C	London
Marsden, J. C.	2C	Cardiff
Mason, R. W.	1C	Glasgow
McBryde, M. A.	2C	Liverpool
Munro, G.	1C	Glasgow
Nicholson, J.W.	1C	Cardiff
Nicholson, T. C.	2C	N.Shields
Paulin, G.	2C	,,
Robertson, A. C.	1C	Glasgow
Ryan, J.	2C	,,
Smith, R. H.	2C	London
Stalker, J. K.	2C	Glasgow
Stant, J.	1C	,,
Strachan, J.	1C	,,
Thompson, R.	2C	,,
White, R. W.	2C	N.Shields
Wilkinson, R.	2C	,,
Wray, J. C.	1C	,,
Wright, J.	1C	Glasgow

August 14th, 1897.

Bremner, A.	2C	Greenock
Brewer, C. W.	2C	Liverpool
Brown, A. G.	2C	Leith
Callow, P. H. E.	1C	Liverpool
Charleson, A. B.	1C	Leith
Firth, H. J.	1C	Hull
Gallimore, G. C.	2C	Greenock
Geach, G. E.	2C	London
Gilchrist, F. S.	2C	Liverpool
Hastings, J. R.	1C	London
Hawkes, W. F.	2C	Liverpool
Hellyer, C. P.	2C	Hull
Hughes, Thos.	2C	Liverpool
Jackson, T. S.	2C	Hull
Jones, John D.	1C	Liverpool
Jones, W.	1C	London
Lucas, S.	1C	Hull
McArthur, G.H.	1C	Leith
Mitchell, J. T.	2C	London
Moffat, J.	1C	Leith
Richmond, A.	2C	Greenock
Shellington, W.	2C	Liverpool
Stark, H. R.	1C	Leith

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Trawler Prince.—On August 26th there was launched from the shipbuilding yard of Messrs. J. T. Eltringham & Co., South Shields, a steel screw trawler which has been constructed (together with a sister vessel) to the order of Mr. W. H. Storey, North Shields. Her dimensions are 96 ft. by 19 ft. by 11½ ft. Compound surface-condensing machinery of 45 N.H.P. will be fitted by Mr. G. T. Grey, South Shields. She was christened the *Trawler Prince* by Master George Storey. Her sister vessel, the *Victorian Prince*, will probably be launched a fortnight hence.

Danubian.—On August 27th an iron steam ketch, of about 135 tons, was launched at North Shields; owned by the Great Grimsby Co-operative Box and Fish Carrying Co., Limited, Grimsby.

Ethiopian.—On August 27th an iron steam ketch, of about 135 tons, was launched at North Shields; owned by the Great Grimsby Co-operative Box and Fish Carrying Co., Limited, Grimsby.

Trojan.—On Saturday, August 28th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel-screw steamer, built to the order of E. C. Thin, Esq., of Liverpool, and of the following dimensions, viz.:—Length, 350 ft.; breadth, 47 ft.; depth, 28 ft. 3 in., moulded; and to class 100 A1 at Lloyd's on the spar deck rule. This vessel has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including five double-cylindered steam winches, direct acting steam windlass, steam steering gear by Messrs. Harrison Engine Co. Limited, and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. The North-Eastern Marine Engineering Co., Limited, are of the triple-expansion type, having cylinders 25½ in., 41 in., and 68 in., by 48-in. stroke, and working at a pressure of 160 lbs., and have been built under the superintendence of Messrs. Irwin, Atkinson, & Young, of Liverpool. On leaving the ways the vessel was named the *Trojan* by Miss Lodge, daughter of Captain Lodge, the owner's superintendent.

Van der Lijn.—On Saturday afternoon, August 28th, Messrs. Wigham Richardson & Co. launched from their Neptune shipyard, Newcastle-on-Tyne, a steel-screw steamer, which they are building to the order of the Koninklijke Paketvaart Maatschappij, Amsterdam, being the second vessel which the builders have in hand for this company. The vessel is 220 ft. in length by 31 ft. beam by 18 ft. deep. She will be rigged as a two-masted schooner, is being built to take the highest class in the Register of the Bureau Veritas, and will have accommodation for both first and second-class passengers. The vessel is intended for mail and passenger service in the Dutch East Indies, and for this purpose attention is being paid to the ventilation, &c., by which the comfort of the passengers may be assured. The engines and boilers are also being constructed by Messrs. Wigham Richardson & Co., the former being of the triple-expansion type, and are designed to drive the vessel at a good speed. The vessel was named the *Van der Lijn*, the christening ceremony being gracefully performed by Miss White. Amongst the company present were Sir W. H. and Lady White, Mrs. Tweedy, Mrs. Boyle, Mr. Van Haseelt, the managing director of the company; Mr. J. de Bruyn Kops, naval architect, of the Hague; and Mr. Metzelaar, superintendent engineer to the company.

Port Victoria.—Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands shipbuilding yard, Sunderland, launched this vessel on Monday afternoon, August 30th. She has been built to the order of Messrs. W. Milburn & Co., of Newcastle and London, and is 354 ft. long, between perpendiculars; 48 ft. 6 in. breadth, extreme; and 25 ft. depth, moulded. She is built to Lloyd's highest class, under their special survey, on the three-deck rules, and has a poop and bridge, arranged for cargo; the whole of the officers' and saloon accommodation being on top of the bridge. The crew, firemen, and petty officers are berthed in the topgallant forecastle. The vessel has a cellular double bottom right fore-and-aft, arranged to carry water ballast, and this will also be carried in the after peak. She has six transverse watertight bulkheads, and shifting boards right fore-and-aft. The vessel is intended for Messrs. Milburn's well-known Australian line, and has been specially constructed to meet their cargo requirements. There are five main hatchways, worked by nine powerful steam winches, supplied with steam by a large multitubular donkey boiler, working at 180 lbs. pressure. A large derrick is fitted to each winch, and every arrangement made for the rapid handling of cargoes. A patent windlass is fitted on the forecastle head, and patent steam steering gear at the after end of the engine and boiler casing, connected by controlling gear with the forward end of the bridge, a powerful screw steering gear being placed on the poop deck aft. The whole of the accommodation is fitted up in a first-class manner, there being separate mess-rooms for the engineers and officers, etc. The chart and wheel-house is placed on top of the saloon house, at the forward end of the bridge. The engines and boilers have been constructed by Messrs John Dickinson & Sons, Limited, Sunderland, the sizes of the cylinders being 24 in., 40 in., 64 in. by 45 in. stroke, supplied with steam by two large multitubular boilers, working at 180 lbs. pressure. The hull and engines have been constructed under the superintendence of Mr. R. Moffitt, of Newcastle, the owners' chief superintendent. The vessel was gracefully christened by Miss Andrée Rickmers, of Bremen, and launched by hydraulic power by Miss von Grüter. There were also present a numerous company of local ladies and gentlemen, including the representatives of the builders' firm. After the launch, which was most successful, the company adjourned to the firm's luncheon room, where the usual toasts were duly honoured.

Lewis.—On August 30th, from Messrs. Robert Thompson & Co.'s Bridge Dockyard, a launch of more than usual interest took place, a newly-built vessel, the *Lewis*, being put into the water sideways. This makes the sixth vessel that has been built at this yard, and the fifth that has been launched sideways. The vessel is 115 ft. in length; 20 ft. in breadth; and 9 ft. 8 in. in depth; and has been constructed to the order of Messrs. Stephenson, Clarke & Co., of London. She is intended for the general coal trade. She is made of steel, and will be engined by the North-Eastern Marine Engineering Works.

Titania.—On August 31st Messrs. W. Doxford & Sons Limited, Sunderland, launched the turret deck type screw steamer *Titania*, 350 ft. by 46 ft. by 27 ft. 6 in. moulded, built to the order of Wilh. Wilhelmsen, Esq., of Tönsberg, under the superintendence of Messrs. McFarlane & Co. The vessel has a gross register of 3,690 tons, steams 10 knots, and is classed under the special survey of Det Norske Veritas through its local representative, Mr. Bodin. On leaving the ways she was gracefully named by Mrs. Egenes, wife of the commander of the vessel.

Presidente Sarmiento.—On August 31st there was floated from the yard of Messrs. Laird Brothers, Birkenhead, a ship specially designed for service as a training or school ship for the Argentine Government. Her approximate dimensions are:—Length, 270 ft; beam, 34 ft.; displacement, about 2,750 tons; draught of water will not exceed 20 ft. The hull is of steel, built with double bottom, and very carefully sub-divided into 24 principal watertight compartments, and coal protection along the machinery spaces. The bottom is sheathed with teak to 4 ft. above the water line, and coppered, while the stem, stern, and rudder frames are of bronze. She has a clipper bow, handsome stern, with gallery, stern walk, poop, forecastle, and steel-plate bulwarks, the material and workmanship throughout being equal to the requirements of the British Admiralty. The accommodation is specially roomy and well ventilated, and the sanitary arrangements of the newest, and provides for a total number of 400, each rank having separate and specially allocated quarters. She is full "ship rig," carrying a large spread of canvas, as it is intended to do a great part of her cruising under canvas; and, in view of this, she is fitted with a Bevis' feathering propeller. The engines are direct-acting inverted triple-compound, driving a single feathering screw propeller of sufficient power to give a speed of 13 knots per hour. There are four boilers, each pair being in a separate watertight compartment with its coal supply. The armament, which is of the most modern type by Armstrong & Nordenfeldt, comprises five 4.7 in., 2 14-pounder Maxims, 4 6-pounders, 4 3-pounders, and other subsidiary armament, as well as three torpedo tubes. Acting on behalf of Madame Dominguez, the wife of the Argentine Minister in London, who was unable to be present, Miss Anne Laird performed the ceremony of

christening the vessel. Senor Florencis Dominguez was also unavoidably absent. The Argentine Government was represented by Captain Don Onofre Betbeder, the present Chief of the Argentine Naval Commission.

Durban.—On September 9th Messrs. Cook, Welton & Gemmell launched at Hull, for the Hull Steam Fishing and Ice Co., Limited, the iron steam trawler *Durban*, a vessel of 158 tons gross.

Aldershot.—On September 13th Messrs. Ropner & Son, Stockton-on-Tees, launched a steel screw steamer of the following dimensions, viz.:—Length between perpendiculars, 280 ft.; breadth, extreme, 42 ft.; depth, moulded, 20 ft. This steamer has been built to the order of the Britain Steamship Co., Limited, and is the sixth steamer built by Messrs. Ropner & Son for the same owners. She is fitted with the builders' patent "trunk," full poop, bridge, and topgallant forecastle. The saloon and cabins for captain and officers will be fitted up in the poop, and the accommodation for engineers will be provided under the bridge deck, the crew being berthed in the forecastle as usual. She has a double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of about 3,200 tons on Lloyd's summer freeboard on a light draught of water; she will have all the most recent appliances for the expeditious loading and unloading of cargoes, has direct steam windlass, steam steering gear amidships, with powerful screw gear aft, four large steam winches, multitubular donkey boiler, stockless anchors, &c. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co, Limited. The christening ceremony was gracefully performed by Miss Nina Watson Munro, of Billington Hall, Stockton, who gave her the name of *Aldershot*.

Asama.—On September 13th there was launched from the Jarrow Yard of Palmer's Shipbuilding and Iron Co., Limited, for Mr. James Mark Wood, of Liverpool, a large screw steamer of the following dimensions:—Length, 380 ft.; breadth, 45 ft. depth, moulded, 30 ft. 9 in. The vessel is constructed of steel to obtain Lloyd's highest class, and will be rigged as a two-masted schooner. She is of the three-deck type, with a poop, bridge, and forecastle. The vessel is fitted with two steel decks extending all fore and aft, and divided into seven watertight compartments, by means of six steel bulkheads. She will also be fitted with a complete system of shifting boards, grain hatches, and all the latest requirements for carrying grain cargoes in bulk. All necessary steam winches, derricks, &c., for the rapid loading end discharging of cargoes will be supplied, and the vessel will be fitted with all modern improvements for a vessel of her class, and is designed to load about 6,384 tons deadweight on about 24 ft. 6 in. draught. As the vessel left the ways she was named the *Asama* by Mrs. Hill, wife of Mr. Maxwell Hill, who has superintended the construction of the vessel on behalf of the owner.

Victorian Prince.—On September 14th there was launched from the yard of Messrs. J. T. Eltringham & Co., South Shields, a steel screw trawler, which has been constructed to the order of Mr. W. H. Storey, North Shields. Her dimensions are 96 ft. by 19 ft. by 11 ft. Compound surface-condensing machinery of 45 N.H.P. will be fitted by Mr. G. T. Grey, South Shields, and it is anticipated that a speed of between 10 and 11 knots will be attained. On leaving the ways she was named the *Victorian Prince* by Master Willie Storey.

South Africa.—On September 14th there was launched from the shipbuilding yard of Messrs. Short Bros., Pallion, Sunderland, a fine modelled steamer to carry about 5,800 tons deadweight on a comparatively light draught, to the order of the Southern Steam Shipping Co, of London. The engines are by Messrs. William Allan & Co., Limited, the cylinders being 25 in., 40 in., and 67 in., by 45 in. stroke, with boilers of 180 lbs. pressure. On leaving the ways the vessel was named *South Africa* by Miss Beatrice Short, of Ashbrooke Hall, Sunderland.

Rustington.—Lately there was launched from the yard of Messrs. Osborne, Graham & Co,, of Hylton, a steel screw steamer, built to the order of Messrs. Bell, Sydmonton & Co., of London. Her principal dimensions are:—288 ft. by 42 ft. by 22 ft. moulded. She is built to the highest class at Lloyd's on the deep-frame principle, thus dispensing with hold beams and web-frames, leaving the holds entirely free for cargo; has cellular bottom and after peak for water ballast, and is provided with four powerful steam winches, steam steering gear, and direct steam windlass. Her engines are to be fitted by George Clark, Limited, of Sunderland. The naming ceremony was performed by the daughter of Alderman Bell, of Newcastle.

LAUNCHES—Scotch.

Alert.—On August 26th there was launched from the Dundee Shipbuilders Co.'s yard a steel screw steamer built to the order of Mr. J. B. Knapton, London. The vessel, which has been named the *Alert*, is of the following dimensions:—Length, 125 ft.; breadth, 22 ft.; depth, 10 ft.; with a carrying capacity of 320 tons.

Ingeli.—On Saturday, August 28th, Messrs. Hall, Russell & Co. launched from their yard at Aberdeen the latest addition to the large fleet of direct Natal steamers owned by Messrs. John T. Rennie, Son & Co., of London and Aberdeen. She is 342 ft. long, 41 ft. beam, and 27 ft. 1½ in. deep, and is being constructed in accordance with the latest experience of this firm for the special requirements of their passenger and cargo service to Natal and the east coast of Africa. She has a beautiful model and is fitted out for first and second-class passengers, state rooms being arranged both above and below deck and amidships and aft to suit all climates and tastes. All the latest luxuries for ocean traffic are being provided for passengers in delicate health as well as for those travelling on pleasure. Electric apparatus of various kinds for lighting, ventilating, heating, and cooking will be provided. Promenade deck is arranged with awnings for hot weather, and the usual powerful deck machinery for quick discharge of cargo is provided, direct steam windlass and steering gear placed aft so as to reduce all noise and vibration to a minimum are being fitted. The officers' and petty officers' quarters are conveniently arranged with a special view to being close to their respective duties, and also for comfort at sea. Messrs. Rennie are assisted in the supervision of the construction by their consulting engineers Messrs. Flannery, Baggallay & Johnson, under whose inspection the machinery has been built by Messrs. Hall Russell. After the launch the vessel proceeded to the sheer legs in readiness for shipment of same. This will consist of triple-expansion engines of high power, driven by large double-ended boilers of ample heating surface, and the auxiliary machinery will comprise refrigerating, electric lighting, heating, filtering, evaporating, sanitary pumping and other machinery.

Bingo Maru.—On Monday afternoon, August 30th, there was launched from the shipbuilding yard of Messrs. David and William Henderson & Co., Partick, a handsomely modelled twin-screw steamer, which has been built to the order of the Nippon Yusen Kaisha of Tokio. This vessel, as in the case of the four similar steamers which have recently been completed by the same builders, has been built under the supervision of A. R. Brown Esq., Japanese Consul at Glasgow, who has been assisted by Captain Periam for the hull, and Mr. George MacFarlane for the engine department. Her principal dimensions are:—Length, over all, 463 ft.; beam, moulded, 49 ft. 2 in.; depth, moulded, 33 ft. 6 in., and a gross tonnage of about 6,000 tons. Classed in Lloyd's 100 A1., three deck rule. A most complete installation of electric light by Messrs W. C. Martin & Co., Glasgow, is being fitted throughout vessel; Napier Bros.' capstan windlass, and Caldwell's steam steering gear. The machinery will be supplied by the builders' firm and consists of two sets of triple-expansion engines, each having cylinders 20 in., 33½ in., and 56 in. diameter, by 48 in. stroke. Steam is supplied by two large double-ended and two single-ended boilers constructed for a working pressure of 200 lbs. per square inch. On leaving the ways the vessel was gracefully named the *Bingo Maru* by Miss James.

Cloughmore.—On August 30th Messrs. John Fullerton & Co. launched at Paisley a steel screw-steamer of about 500 tons, which has been built to the order of Messrs. Joseph Fisher & Sons for the Frontier Town Steamship Co., of Newry, for their coal-carrying trade to that port, and for which the steamer has been specially designed and arranged, having all the latest improvements. Compound engines of 600 H.P. are to be supplied by Messrs. Hall Brown, Buttery & Co., Govan. The steamer was named the *Cloughmore* by Miss Donald, Gauze Street, Paisley.

Chicago.—On August 31st Messrs. Ramage & Ferguson, Limited, Leith, launched a pneumatic grain elevator, built to the order of the London Grain Elevator Co.,

Limited, for use at the docks in London. This is a new method of discharging grain straight from the holds of steamers into barges, the whole process, even to the weighing, being automatically done, and thereby saving a great deal of labour, while the rapidity of discharge is very much greater than by the ordinary methods, being at the rate of 120 tons per hour. This pneumatic system is known as Duckham's patent, and this elevator has been built under the superintendence of Mr. Hough, consulting engineer to the Grain Elevator Co. The barge is 70 ft. by 24 ft. by 15 ft., moulded, and contains powerful machinery for taking the grain from steamers' holds into barges. The barge was named *Chicago*.

Indravelli.—On August 31st Messrs. Charles Connell & Co. launched from their shipbuilding yard at Scotstoun a steel screw-steamer built for Mr. T. B. Royden, Liverpool. The dimensions are:—Length between perpendiculars, 400 ft.; breadth (moulded) 49 ft.; depth (moulded) 31 ft. 3 in.; carrying about 7,600 tons. She has been built to Lloyd's highest class, with a cellular double bottom the whole length of vessel, and with both peaks fitted as tanks for water ballast. The upper and main decks, right fore and aft, are of steel, the upper deck being of chequered steel, while the poop, bridge, and forecastle decks are of pine. The vessel is equipped with the most modern appliances for safety and efficient working. Accommodation is provided in a house on the bridge deck for the captain, officers, and engineers, the crew as usual being berthed in the topgallant forecastle. The engines are of the most improved triple-expansion type, with large single-ended boilers fitted with Howden's system of forced draught. They are being constructed by Messrs. David Rowan & Son, of Glasgow. As the vessel left the ways she was named *Indravelli* by Mrs. Rooper, daughter of the owner.

Kassala.—On August 31st the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, launched from their yard at Govan, a large steel screw steamer for Messrs. Maclay & M'Intyre, of Glasgow. The dimensions of the vessel are—370 ft. by 48 ft. by 27 ft. 6 in. moulded, and about 4,100 tons gross, with poop, bridge, and topgallant forecastle. She is designed to carry about 6,200 tons deadweight on a comparatively small draught of water, which will enable her to enter and leave many ports with a full cargo on board. She is built to Lloyd's highest class for a three-deck ship, and is fitted with all the most modern appliances for handling cargo, &c., including eight large steam winches, steam steering gear, and steam windlass. There is a double bottom throughout except under the boilers, and the after peak is fitted as a water ballast or fresh water tank up to the upper deck. The accommodation for captain, officers, engineers, &c., is situated at the fore end of the bridge deck, and is away from the heat of the engines and boilers, the coaling hatches, &c. The arrangements generally have been designed with a view to give the largest deck area available for carrying cattle, timber, &c. The vessel is fitted by the builders with triple-expansion engines. The cylinders are 23½ in., 39 in., and 64 in. in diameter respectively, with a stroke of 48 in. The surface condenser is placed at the back of the engines, and, like the air and circulating pumps, is of large capacity. The latter are worked by levers from the low-pressure engine, the feed and bilge pumps being driven by the same gear. There are four auxiliary steam pumps—one for ballast purposes, which can also be used as a bilge pump or as an auxiliary circulating pump; a duplex pump for general purposes, a special feed pump with float tank and automatic control, and a smaller duplex pump for the winch boiler. To maintain a supply of fresh water for the boilers, a large Morison's evaporator is fitted in the engine-room, with the requisite connections. The main boilers are two in number, single-ended, and 14 ft. 3 in. in diameter by 11 ft. 3 in. long. Each boiler has three furnaces. The working pressure is 180 lbs. They are fitted with Howden's forced draught, and the direct-driven fan and engine have also been supplied by Messrs. Howden & Co. A winch boiler of large size is fitted on deck. All the arrangements, connections, and fittings are most complete, and everything has been done to make the handling of the engine department as economical and as efficient as possible. As the vessel left the ways she was named *Kassala* by Mrs. Richard H. Hunter, of Glasgow.

Exeter, Falmouth, and Greenock.—On September 1st Messrs. Mackie & Thomson, Govan, launched three screw fleeters of 160 tons each, for Messrs. Hagerup, Doughty & Co., Grimsby. The vessels will be supplied with triple-expansion engines by Messrs. Muir & Houston, Kinning Park. They were named by Miss Houston, Dumbreck; Miss Dunlop, Ayr; and Miss Mysie Houston, Dumbreck.

Vasco Da Gama.—On September 8th Messrs. Carmichael, Maclean & Co. shipbuilders, Greenock, launched a twin steel screw tug named *Vasco Da Gama*. Length, 80 ft. 9 in.; breadth, 17 ft. 9 in.; depth, 8 ft. 10 in. To be supplied with two sets of compound surface-condensing engines; gross tonnage, 110 tons, moulded. She has been built to the order of Messrs. T. Albert Crompton & Co., consulting engineers, Leadenhall Street, London, for special service abroad.

Cape Leeuwin.—On September 9th Messrs. Russell & Co., Port-Glasgow, launched the screw steamer *Cape Leeuwin*, built for the Australian Transport Co. for coasting and passenger trade. This steamer will be capable of carrying 4,300 tons deadweight, and will have accommodation for 60 first-class and 200 steerage passengers. The steamer is fitted throughout with electric light, and is finished in a superior style for the comfort of passengers. Triple-expansion engines will be supplied by Messrs. Huston & Sons, Glasgow. The ceremony of naming the vessel was performed by Mrs. Sheddon, wife of Captain Sheddon.

Ronan.—On September 10th Messrs. Ramage & Ferguson, Limited, launched from their shipbuilding yard at Leith a steel screw steamer, built to the order of Messrs. George Gibson & Co., for their Leith, Rotterdam, and other trades. The new vessel, which has been built to the highest class at Lloyd's, and in accordance with all the requirements of the Board of Trade for passengers, is of the following dimensions:—Length B.P., 259 ft. by 33 ft. 9in. by 18 ft. 9 in. depth moulded, having also full poop-bridge and top-gallant forecastle. Accommodation for a large number of first-class passengers is fitted up aft in a most tasteful and comfortable manner, while forward all the accommodation for other classes, and for working cargo in a rapid manner, have been carefully attended to. Steam gear is applied all over the ship to work cranes, winches, steering gear, windlass, and specially the electric lighting, which is of an unusually perfect description. A double-bottom fore and aft provides water ballast for stability when light cargoes are carried, this also being assisted by rolling fins on each side, made of heavy bulb steel, while the model of the ship is designed to make her a specially good sea boat. For propulsion the vessel is fitted with a powerful set of triple-expansion engines, having cylinders 21 in., 33 in., and 54 in. diameter, by 42 in. stroke, supplied with steam from two steel boilers, working up to a pressure of 170 lbs. All the latest mechanical appliances for efficiency and economical working have been adapted with the view of keeping up a steady sea speed, fully equal to any vessels in the trade. The launch was witnessed by a large and influential assembly, and at one o'clock precisely the steamer began to move down the ways, when the ceremony of naming her the *Ronan* had been successfully performed by Mrs. Somerville, of Glencairn, Dalkeith. After the launch, which was most successful in every respect, a large party adjourned to the company's model room for lunch, where afterwards Mr. Somerville, of Messrs. George Gibson & Co., in acknowledging the toast of success to the *Ronan*, proposed by Mr. Ramage, alluded to the interesting fact of their firm having been in business in Leith since the end of last century, when sailing smacks carried on their trade with the Continent. With an uninterrupted record of steady progress their company had conducted a trade up to the present day, when their fleet of 14 steamers make twelve weekly sailings from each side to Rotterdam, Dunkirk, Calais, Harlingen, Ghent, Amsterdam, and Antwerp. Mr. Campbell Gibson, in proposing the health of the builders, alluded to the pleasant business relations which had existed between the two firms for the last 20 years, and expressed his hope that it might continue for many long years to come. In the *Ronan* they believed they had acquired a steamer which would do her work to their entire satisfaction, and be a credit to their trade. Mr. Ferguson replied, and afterwards proposed the health of Mrs. Somerville, who had named the ship, to which Mr. Somerville replied, and the proceedings then terminated.

Batavier III.—On September 14th Messrs. Gourlay Bros. & Co., Dundee, launched from Camperdown Shipyard a steel screw steamer named *Batavier III.*, built for the Nederlandsche Stoomboot Maatschappij of Rotterdam. Her dimensions are:—Length, 244 ft.; breadth, 33 ft. 6 in.; depth, 16 ft.; with

a gross tonnage of about 1,140 tons. The vessel is the sister to the *Batavier II.*, which Messrs. Gourlay are at present also engaged fitting out, and will be identical to her in all respects. She is likewise intended for the company's cross-Channel trade. The vessel has been constructed under special survey to the highest class in Bureau Veritas Registry. The naming ceremony was performed by Mrs. Captain Sauer, Rotterdam, and was witnessed by a large number of persons. After taking the water the vessel was towed to Victoria Dock, where she will be fitted out.

Fishing Skiff.—On September 14th there was launched from the boatbuilding yard of Mr. A. Munro, Ardrishaig, a beautifully-modelled fishing skiff of a new type. The skiff is 36 ft. over all, 6 ft. 6 in. in depth, 11 ft. beam, wth a draught of 7 ft. aft. She is decked all over, and would make an excellent cruising yacht. She has been built to the order of Mr. John Fraser, Altabuie, Ross-shire.

TRIAL TRIPS.

Egypt.—On August 27th the great 8,000-ton steamer, *Egypt*, built and engined by Messrs. Caird & Co., Greenock, for the P. & O. Co., underwent her official trials. These were of a very successful kind, and the steamer, which is a sister ship to the *India*, was taken over by the company.

Tenriugawa-maru.—On Wednesday, July 28th, the twin-screw steel steamer *Tenriugawa-maru*, the second of the three steamers ordered by the Osaka Shosen Kaisha from the Osaka Iron Works, Dock and Shipbuilding Yard, went on her trial trip. A speed of nearly 14 knots was made, the machinery working admirably without the slightest hitch, and entire satisfaction was given to the company's representatives who were on board. The first of the company's new vessels was the *Oigawa-maru*, which for speed and comfort has proved a favourite with the travelling public. It is rumoured that when the third vessel is completed the company intend running them on the Yangtse River. The steamers are fitted with a complete electric light installation, and are a decided credit to their builders.

Goorkha.—On August 28th the new twin-screw steamer, *Goorkha*, the eighth vessel built by Messrs. Harland & Wolff, Limited, for the Union Steamship Co., left her moorings and proceeded down Belfast Lough for a trial trip and adjustment of compasses. This steamer is the third of the new vessels which Messrs. Harland & Wolff have had in hand for the Union Co., all being of a somewhat similar type to the well-known "G.'s," also built by them, and already running in the same service. They are, however, of considerably larger dimensions, and with unusually complete accommodation for first, second, and third class passengers. The dimensions of the *Goorkha* are:—Length, 430 ft.; breadth, 52 ft.; and depth, 33 ft. Her tonnage is over 6,000 tons register, and the propelling power consists of twin-screws, driven by two sets of triple-expansion engines, constructed by the builders. The vessel provides a large carrying capacity for cargo on a light draught of water. The saloon is handsomely decorated in oak and teak, the ladies' rooms in dark mahogany, with marqueterie panels, satinwood, and other wood; the smoking-rooms in oak; the second saloon in mahogany and satinwood, and the library is handsomely fitted up with bookcase and writing-desk, and surmounted by an elaborate dome with richly-decorated glass. Complete installations of electric light and refrigerating apparatus, with cold chambers for the conveyance of fruit, have been provided. The *Goorkha* is commanded by Captain Mosely.

Whimbrel.—On September 2nd the steamer *Whimbrel*, built by the Caledon Shipbuilding & Engineering Co., Limited, for the Cork Steamship Co., Limited, proceeded down the Tay on her official trial trip. The vessel has been specially built for the company's trade, under the special survey of the British Corporation. The trial trip was successful in every way, and satisfactory to both owners and builders. The *Whimbrel* left Dundee for Dunkirk immediately after the trial trip.

Alpha.—On Saturday morning, September 4th, the s.s. *Alpha* left the port for her trial trip. She is a steel-screw steamer of 280 ft. in length, 39 ft. breadth, and 18 ft. 2 in. depth, and has been built by Messrs. Wm. Gray & Co., Limited, for Mr. B. J. Van Hengel, of Amsterdam, through Messrs. E. A. Casper & Co., of West Hartlepool. She has been built to Lloyd's highest class, has a half-poop, raised quarter-deck, and partial awning-deck, with houses on deck for cabins. The hull is built with deep framing and cellular double-bottom, and the equipment is of the most improved description, including steam windlass, steam steering gear, four steam winches, &c. She has triple-expansion engines of the Central Marine Engine Works' manufacture, having cylinders 19 in., 30½ in., and 51 in diameter, with a piston stroke of 36 in., steam being supplied by two steel boilers working at a pressure of 160 lbs. per square inch. The vessel left the harbour about eight o'clock, and after the usual adjustment of compasses by Mr. Berry, a full steam trial was made, when everything was found to be in perfect order, the ship and her machinery giving the greatest satisfaction. There were present: Mr. B. J. Van Hengel and Mr. Bok, Captains Johansen and T. Dekker, representing the owners; Captain Murrell and Mr. Lindsay representing the builders of the ship and engines respectively. The trial over, and her visitors discharged, the vessel proceeded on her voyage to Nederkalix to load.

Vanda.—On September 6th the screw steamer *Vanda*, which has been built to the order of Mr. Wyse, of West Hartlepool, for coasting and Continental service, proceeded on her official trial trip. The vessel was built at the Howdon Shipyard of Messrs. Edwards Brothers, is of steel, and is of the following dimensions:—Length, 140 ft.; breadth, 23 ft.; depth, 11 ft., moulded; and will carry 600 tons on light draught. The engines are of triple-expansion, having cylinders 12 in., 18 in., and 30 in. diameter by 21 in. stroke, and large multitubular boiler, working at 160 lbs. pressure. The vessel had a most successful run along the coast, and was afterwards put on the measured mile, with the result that a mean speed of 9 knots was obtained, which was considered highly satisfactory to both engineers and builders.

Van Swoll.—On Tuesday, September 7th, the s.s. *Van Swoll*, which has been built by Messrs. Wigham Richardson & Co., Neptune Works, Newcastle-on-Tyne, for the Koninklijke Paketvaart Maatschappij, of Amsterdam, went for a very successful trial trip off the Tyne. The steamer is 280 ft. in length by 36½ ft. beam, she is rigged as a schooner, and is classed by Bureau Veritas. She is provided with a shade deck all fore and aft, and has very comfortable accommodation for first and second-class passengers, besides deck passengers. As the steamer is to trade in the East Indies, her decks and fittings are all of teak, and special attention has been paid to the ventilation, electric lighting, &c. The engines, which are of the triple-expansion type, together with the boilers, have also been constructed by Messrs. Wigham Richardson & Co. On the trial trip the engines worked without the slightest hitch, giving complete satisfaction to all concerned, and driving the vessel at a speed of 12 knots per hour. The owners were represented by Mr. Van Hasselt, the managing director of the company; Mr. J. de Bruyn Kops, naval architect, of the Hague; and Mr. Metzelaar, superintendent engineer to the company; Mr. Meijer, from Batavia, being also present.

Duchess of Kent.—On September 9th a successful trial trip of the *Duchess of Kent* took place at the measured mile in Stokes Bay. Six consecutive runs were made on the measured mile at full speed, the machinery working most smoothly, when a mean speed of 14¾ knots was obtained with natural draught. The coal consumption trial was also equally satisfactory, being well under 2 lb. per I.H.P. The representatives of the two railway companies for whom Messrs. Day, Summers & Co. have built the vessel, expressed themselves perfectly satisfied with the results obtained, and the vessel will take her place in the service of the joint companies as soon as the necessary formalities are completed.

Aulne.—On September 10th the *Aulne*, built by Messrs. R. Craggs & Sons to the order of Messrs. Pile & Co., of London, for Messrs. Chevilotte Frères, of Brest, went out on trial from the Tees. This vessel is a steel screw steamer, 220 ft. long, 33 ft. beam, by 16 ft. 3 in. depth moulded. The machinery, which has been constructed by Messrs. M'Coll & Pollock, of the Wreath Quay Engineering Works, Sunderland, is of their latest improved triple-expansion type, having cylinders 17 in., 28½ in., and 46 in. diameter, with a stroke of 30 in. Steam is supplied by one large steel boiler, working at a pressure of 160 lbs. per square inch. An improved feed-heater and evaporator has also been fitted. After adjusting compasses the ship headed to the north in order to test the speed, and, notwithstanding a choppy sea and head wind, a speed of over 10 knots was

obtained. The machinery worked throughout the trial in a thoroughly satisfactory manner.

Suomi.—On September 11th the *Suomi*, built by Messrs. R. Craggs & Sons to the order of the Flensburg Stettiner, and intended for their Baltic and Black Sea trade, went out from the Tees for her official trip. This vessel is a steamer of 178 ft. in length, 27 ft. 10 in. beam. The machinery, which has been constructed by Messrs. M'Coll and Pollock, of the Wreath Quay Engineering Works, at Sunderland, consists of triple-expansion engines, having cylinders 14 in., 22½ in., and 37 in. diameter, with a stroke of 27 in. steam being supplied by two boilers of 9 ft. 6 in. diameter by 9 ft. 3 in. long, working at a pressure of 160 lbs. per square inch. fitted with Brown's patent furnaces, and built to the requirements of Lloyd's Registry and German law. On a 3½ miles' course the mean of the runs north and south was slightly over 10 knots, or one quarter knot in excess of the guaranteed speed, the consumption of coal being at the rate of 1·26 lb. per I.H.P. per hour, considerably under the guaranteed amount.

Wiltshire.—On September 13th the *Wiltshire*, built by Messrs. John Priestman & Co., Sunderland, left the River Wear on a trial trip. She is a first-class cargo boat, built to the order of Messrs. Thompson, Elliott & Co., of Newcastle, and is fitted with all modern requirements for the Black Sea and general cargo trade. Her dimensions are:—Length, 290 ft.; beam, 42 ft. 3 in.; draught, 18 ft. 3 in.; deadweight capacity, 3,600 tons. Classed A1 at Lloyd's. The engines are triple-expansion, the cylinders 22 in., 36 in., and 59 in., by 39-in. stroke. On the trial they were run to 104 revolutions per minute, and worked steadily. The vessel had been expected to run at 11 knots per hour, but on going south attained a speed of 14·4 knots per hour, to the surprise of all on board. On returning the mile was covered at the rate of 12·12, giving a mean speed of 13¼ knots per hour.

Deusto.—On Tuesday, September 14th, the fine steel screw steamer *Deusto*, built by Sir Raylton Dixon & Co., Limited, Cleveland Dockyards, Middlesbro', to the order of Senor Ramon de la Sota, of Bilbao, was taken out to sea for her official trials under the command of Captain Manuel Elovteque. She is built to Lloyd's highest class, raised quarterdeck rule, her principal dimensions being:—Length, 259 ft.; beam, 37 ft.; depth, moulded, 19 ft. 6 in., and has a deadweight capacity of about 2,500 tons on a very light draught of water. All decks are of steel and iron and she is fitted with four bulkheads, plate and bilge keels, with water ballast in cellular double bottom and after peak. Triple-expansion engines have been fitted by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, having cylinders, 18 in., 29½ in., 48½ in. by 33 in. stroke, with two large single-ended boilers working at 160 lbs. pressure. The hull and engines have been built under the personal supervision of Captain Luis de Ybarra and Senor Torres respectively. The trials passed off most successfully and gave great satisfaction to all concerned.

Riojano.—On Saturday morning, September 18th, the s.s. *Riojano* (late *Borderer*) left the river on her trial trip, having had her machinery converted by Messrs. David Rollo & Sons, Fulton Engine Works, Liverpool, to quadruple expansion, with a pressure of 240 lbs. per square inch, in three large boilers worked under forced draught. Considerable repairs and alterations to the hull have also been effected. On the trial everything worked in a highly satisfactory manner. The alterations have been carried out to the specification and under the supervision of Messrs. Geo. Hepburn & Son, assisted by Captain Telleria and Mr. G. Barclay, the company's overlookers. Messrs. Rollo have another of this company's steamers presently in hand for tripling the machinery. The *Riojano* is the latest addition to the fleet of La Bandera Espanola line of Spanish steamers hence to the island of Cuba (of which line Messrs. Hawkes, Somerville & Co., 22, Water Street, are the general agents). She is commanded by Captain Guerrica, late of the steamer *Placentino*.

Saint Helen.—On Saturday morning, September 18th, the fine steel screw steamer, *Saint Helen*, left the port for her trial trip. She has been built by Messrs. Wm. Gray & Co., Limited., to the order of Messrs. Smith & Scaramanga, of London. She takes Lloyd's highest class, and is of the following dimensions:—Length, over all, 320 ft.; breadth, 44 ft.; and depth, 23 ft. 3 in. The deck erections consist of a poop, bridge over machinery space, and topgallant forecastle. A handsome saloon and cabins for officers, &c., have been fitted in the poop, the engineers' rooms are in the bridge, and the crew's accommodation forward. The hull is built on the web frame principle, with a cellular double bottom, large hatchways, powerful steam winches, steam steering gear amidships, hand screw gear aft, patent donkey boiler, patent direct steam windlass, boats on beams overhead, shifting boards throughout, stockless anchors, two masts with schooner rig, and a complete outfit for a first-class cargo vessel. The engines have been supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited, and are triple-expansion engines having cylinders 23in., 36½ in. and 62 in. diameter, with a 39 in. piston stroke, and two large steel boilers working at a pressure of 160 lbs. per square inch. After adjustment of compasses by Mr. Morton, of Sunderland, a full-speed trial was made, the machinery running with great smoothness and without hitch, and great satisfaction being expressed with the performance of both ship and machinery. There were present, Mr. Smith (managing owner); Mr. E. Berry (superintendent engineer to the firm); Mr. Harrison, Mr. Alder and Mr. Metcalfe (visitors from the s.s. *Mary Nixon*, undergoing repairs in the port); Captain Murrell (representing the shipbuilders); and Mr. Jas. Lindsay (representing the engine builders.) On completion of the trial the vessel proceeded to the Tyne to load for Savona.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

ON THE BEARINGS OF MARINE ENGINES.

To the Editor of THE MARINE ENGINEER.

SIR,—Having read with interest Mr. Dewrance's paper in the February issue of the MARINE ENGINEER, I venture to think that, in the light of the subsequent discussion to which it gave rise, and in my own knowledge and experience, Mr. Dewrance has not quite exhausted the subject from a practical standpoint. For example—in the mode or modes of preparing a surface for the reception of white metal, either for revolving or sliding surfaces, Mr. Dewrance is silent. Yet this is one of the chief essentials, as all such should be thoroughly clean and well tinned, if the application is to be successful. A correct knowledge of this is highly necessary to the marine engineer. Doubtless this is nothing more than an omission on the part of Mr. Dewrance.

Mr. Dewrance's theory as to the point at which a bearing should, or should not receive its lubricant, is one which I have persistently advocated during the past 20 years. In order to show from what I derived this idea, let me invite your attention to the machine used for the printing of calico cloths. In this machine there is a copper roller, bearing the imprint of the desired pattern, the bottom side of which is in contact with thick colour within a trough or box, the colour being carried to the cloth by the roller; but before coming in contact with the cloth the colour is intercepted by the edge of a strong, sharp steel plate, known as "doctor," which so completely removes all colour from the roller, save the indents forming the pattern, that the cloth retains all its purity of whiteness. This, I submit, is an equivalent action to the edge or edges of the oil groove in the crown of the bottom end connecting rod boss.

Whatever the alloy which an engineer may decide to use, he must, in order to bring both bearing and white metal to one solid compact mass, thoroughly tin the bearing or slide shoe. The tin having taken the middle position, and having united with both bearing and white metal, gives to the mass the required solidity. But the securing of this desired adhesion is by no means certain with a zinc or a lead alloy The affinity possessed by the lead or zinc alloy—especially the latter—is so great that, generally, not a vestige of the tin will be left on the surface of the bearing or slide. The evil is more pronounced with iron or steel, and hence the loosening of the white metal. This may be seen on examining white metal pieces in old brasses.

In the case of an alloy referred to in the discussions upon the

paper as having answered well for nine years in a crank pin and slide shoe, I would suggest was of a zinc alloy. The white metal, although loose, has, probably, been kept in its place by the two surfaces having holes drilled in before the white metal was applied. Thus the lubricant has found its way into the open space between the slide shoe and the white metal, which, with heat, will soon find its way into the white metal and blacken it. Hence the "decayed or corroded" appearance.

In the case of a zinc alloy—within my knowledge supplied to large end connecting rod brasses by an eminent firm of locomotive builders—when given the usual "trial trip," the two large end connecting rod brasses became so hot as to fuse the white metal before 20 miles had been covered, and the engine had to be hauled home. A tin alloy was then substituted with the most satisfactory results.

Whilst on the subject of connecting rod bosses, let me say that, as many builders continue the old practice of having a division bar in the crown of each top and bottom boss in connecting rod large end, with the double object, as I take it, of retaining the white metal, and of providing something more substantial than white metal to bear the load and take the thrust.

I have seen with this arrangement repeated failures by the heating and melting out the white metal. But once cut away all these bars and reline the bearings, all goes well. My observation in this particular has not reference to one engine only, but to many. As 1-16th in. "draw" is allowed for the purpose of taking up wear, I have known a few cases of failure due to an injudicious use of the lead hammer.

I am well acquainted with a pair of stationary compound engines which about 18 years ago had all beam-link and connecting rod bosses bored out and then filled with a liberal thickness of white metal, thus possessing no dovetailed bars or retaining walls of boss. From then till now these bearings have not required or received repairs of any kind. Given a good tin alloy, I differ from the opinion that the heat in the crosshead might cause the white metal to work badly, for every day I not only see white metal answering admirably in the crosshead of locomotives, but find the same metal answering equally well as a bush in piston rod gland. Surely, then, if the white metal will answer well as a bush in the gland, with steam at 150 lbs., there can be no doubt about it in the crosshead bosses. But, in addition to this, I could name four steamers, each indicating about 5,000 H.P., all having a tin alloy in both top and bottom ends of connecting rods, yielding results of the most satisfactory character, and requiring but the minimum of attention from the staff of engineers.

As regards the hammering of white metal I would say,—"Don't do it." A good tin alloy does not require it, and others are not worth having.

As Mr. Adamson suggests that—"At any rate, a better knowledge of the behaviour of the different kinds of white metal from an experimental point of view would be most valuable to all engineers," I hope that by my humble efforts to lay before your readers some portion of my practical experience and observations in white metal bearings, I may have been of service to some marine engineers—be they many or few.

Yours, etc.,

SAM. HEAZLITT.

Oswestry.

THE SCREW PROPELLER.

To the Editor of THE MARINE ENGINEER.

SIR,—In your issue of September 1st you have a leading article dealing with the probable future development of the screw propeller. In regard to this, I think it will be admitted by the great majority of marine engineers that you have struck a welcome note, and that it is to be devoutly wished that your remarks may serve to stimulate efforts in the direction of collecting data and information on such high-speed propellers as have been already constructed, and, at the same time, in pointing the way which should be taken in carrying out future experiments and research.

As you have hinted, it does certainly seem natural that the course to be taken in future propeller design, when speeds become even higher than they are at present, and steam turbines come to be used, will be to split up the blade surface and to have a larger number of blades, each having a smaller surface than the existing blades. My reason for supposing this to be the case arises from some experiments that have already been made in this direction, and which I happen to have some knowledge of. A propeller which has been in use for some years—known as the Myers Propeller—and which has passed beyond the experimental stage, has been applied to a number of ships, both large and small. The principle adopted is the same as you have indicated, namely, a subdivision of the blade surface. The same number of blades are used as in the case of an ordinary propeller, but each blade consists of two smaller or narrower blades joined circumferentially by a curved bridge piece, and thus forms a loop. I believe this plan has effected an improvement in most cases, both as regards efficiency, vibration, and control.

What appears to be wanted is a thorough investigation in the direction indicated by these existing results, and especially as regards the effects at high speeds. The Institution of Mechanical Engineers made a series of exhaustive trials upon marine engines to determine the usefulness of the steam jackets. Why cannot a similar investigation, not necessarily by the same body, be undertaken in order to discover useful data relating to the design of propellers for high speeds of rotation.

I am,

Faithfully yours,

W. C. POPPLEWELL.

Leeds,
Sept. 21st, 1897.

LINE-THROWING GUN.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—Under the heading of "Fleets of the Mail Lines," in your August number, I note you favourably mention my Line-throwing Gun "as a safety appliance" which might be utilized on many occasions, not only for the saving of lives, but also of ships, and it is specially for the latter object I wish to draw your attention. You state a case "in the neighbourhood of Socotra," when the P. & O. steamer, *Valetta*, hesitated to lower a boat, as there was a violent sea running, but, that an attempt was afterwards made to do so, with the result that the boat was swamped, and all the lives of the crew lost. I wish to point out to you, that on numerous other occasions there has been loss of life and property at sea owing to the fact that ships are not equipped with a handy and efficient "line-throwing apparatus," notably the loss of the *Warner* Light vessel, when the *Irene*, failing to effect line communication with her, lowered a boat for the purpose of doing so, but the boat was swamped, and all the crew lost. Since then the Trinity House provided their ships with my line-throwing guns, and I can only say, if shipowners continue to be blind to their own interests, and not provide their ships with some efficient means of effecting line communication at sea, that the public will hear often of these shipping casualties.

Thanking you for the able article you wrote,

I am,

Yours very faithfully,

J. D'ARCY IRVINE,

Retired Commander R.N.

AMBULANCE CLASSES.

To the Editor of THE MARINE ENGINEER.

DEAR SIR,—In the interesting references to the Board of Trade inquiry *re* P. & O. s.s. *Aden*, which appear in your issue of yesterday, you mention the third engineer's weary days of waiting for help with a dislocated shoulder, and then go on to say that seafaring men, especially engineers, might well be inclined to take a course of St. John Ambulance "First Aid" teaching "if the fact of their ability to attend the classes were only notified to them." Ambulance classes are opened in these rooms at 5 to 6, or 6 to 7 p.m. twice a week, whenever eight or ten students present themselves. Seagoing officers, engineers or others members of the society or not, are invited and welcomed as students. I enclose a syllabus of the lectures, which are given by a qualified surgeon, and shall be much obliged if you make known these opportunities to your readers.

Yours truly,

A. G. FROUD, Lt. R.N.R.

Shipmasters' Society's Rooms, London, E.C.
September 2nd, 1897.

The Marine Engineer.

LONDON, NOVEMBER 1, 1897.

THE lamentable accidents to the *Lynx* and *Thrasher*, and the consequent fatal result to several of the stokers by the bursting of the steam-pipe from the deformation of the hull through the violent impact of the vessel upon the rocks, will lead thoughtful engineers to consider the serious liability to fatal accident to which the occupants of the stoke-hold are exposed by the sudden fracturing of the connecting steam-pipe between boilers and engines, and the problem is not an easy one to solve as to how such connections can be made to minimize or remove risk of fracture of such pipes. Such fractures are too common, and result very frequently in as serious damage to life and limb as if the boilers had burst. In fact, with small section tubular boilers, the danger from steam explosion from the connecting-pipe is greater to the occupants of the stoke-hold than from the bursting of any small tube or section of the boiler. The danger of such fracture is no doubt arising from the fact that where a boiler is working at high pressure it contains a large volume of water heated to much above the boiling point, which is ready to flash into steam the moment the steam pressure is suddenly relieved by a fracture which cannot be at once controlled. It is little use to continue to strengthen the pipe connections by increase of metal if such increase produces greater rigidity in the pipe connections. It is the comparative rigidity, as compared with the flexure or deformation of the hull, that causes the steam-pipes to be so liable to fracture. And where rigidity exists in such connections the tendency to fracture may be and is very great as a consequence merely of the straining of the hull in a sea-way without a collision or other shock. To obtain as much flexibility as possible the tendency at present is to employ a ductile metal of comparatively small tenacity, and therefore with too little margin of safety in case of over strain or corrosion. We have still to see the application of a metal of great tenacity and high margin of safety, with, at the same time, great elasticity. We have never heard of such main-pipe connections being made with a composite flexible tubing capable of standing the present high pressures, and yet we do not see why such an adaptation should not be feasible. Nor do we see why the most perfect metal as regards high tenacity and elasticity such as steel might not be applied with such a curved or coiled form as to present perfect elasticity between the flange attachments or between the engine and boiler. Another mode of attempting to avoid the most serious result of the fracture of a main steam-pipe, supposing no perfectly elastic pipe can be obtained of sufficient strength and durability, would be to limit the explosive outrush of steam to the contents of the steam-pipe. The contained volume in such a steam-pipe would in itself do little damage to the occupants of a stoke-hold, unless the first discharge was absolutely upon the person of a stoker or engineer, and such first issuing steam would be fairly dry, and would not produce such scalding or fatal effects as a lower pressure discharge of mixed steam and water. It is this latter effect, discharged from the boiler itself, that is so fatal, and it can hardly be expected that the screw-down valve can be closed in time by hand to prevent such secondary rush. Why should there not be an automatic valve in every steam-pipe close to the boiler? which whilst remaining open during normal supply, would close automatically when the equilibrium between the steam in the steam-pipe and that in the boiler is violently disturbed by the fracture of the steam-pipe. We should be glad to know if such a safety appliance as applied to steam-pipes exists.

AT last the London Ship Repairers' Association has been involved in the engineers' strike, very much, we should imagine, against their wish, as all such jobbing work is less affected by abnormal wages than manufacturing work, and the loss and trouble to the employers and their customers from inability to immediately undertake and complete urgent repairs is greater than would be the case in an absolute stoppage of production in a manufacturing or building works. The boiler-makers employed in these firms have seen fit, against the commands and agreement of their union representative, to cease work upon a mere trifling pretext, and it is with pain that we have to point out the natural result of such paralization of the London ship-repairing trade. The shipowners must naturally look to other ports for the carrying out of their repairs, and there are so many ports in other countries now competent to carry out such work that the shipowners will have no difficulty in finding such. They may even find that in such ports as Antwerp and other continental ports, as also in Bombay, Japan, and colonial ports, other than Australian ports, where British labour is still very expensive, they may find their repairs carried out as well and more cheaply than at home. The P. & O. Co. have already a repairing shop in Bombay, where native Indian labour is as cheap as dirt, and are therefore independent of their London shops. We understand, also, that in the case of two vessels both damaged to about the same extent in collision, one of which was repaired

in London, and the other in Antwerp, the latter came out in the matter of cost at about half the figure of the former repaired in London. When will British workmen learn the significance of such facts, and realize that in obstructing and rendering dearer the cost of work in Great Britain, they are driving even British customers most unwillingly to find cheaper markets abroad? We are afraid the workmen, deceived, as they are so often by agitators whose livelihood depends upon disturbance, will learn that work may be driven away only when they have lost it.

JAPAN is rapidly coming to the front as a shipbuilding nation. During the past year the building of ocean-going steamers have been undertaken with the greatest success at Nagasaki. One steamer of 1,500 tons registered tonnage has been built under the strictest requrements of Lloyd's special survey, for one of the principal shipping companies of Japan, and was successfully launched early this year. Another of 6,200 tons, with a speed of 12½ knots, is now under construction, and it is anticipated her launch will take place in November. This latter vessel is being built exactly on the lines of those vessels previously built on the Clyde for the present customers, and we know what perfect imitators the Chinese and Japanese are. The best superintending skill from Great Britain is engaged regardless of cost, and it is hoped that she will be completed in no longer time than was required for hersister ships as built on the Clyde. Two other large steamers are also in course of construction, of 2,500 and 1,500 odd tons. So we may consider that the Japanese are well launched on a career of ocean steamship building. Their docks and yards at Nagasaki are also open for the repair of vessels of all nationalities. Twenty-four small vessels of war of various nationalities, aggregating to a tonnage of 63,104 tons, and 65 merchant steamers, with an aggregate tonnage of 190,668 tons, were docked during the year, and 36 vessels of 21,047 tons were placed on the slips. The year 1896 has thus been a busy and satisfactory year to the Japanese building yards and repairing docks and slips.

THE matter of broken shafts, tail-end and otherwise, has always been a cause of anxiety to shipowners and underwriters, and of more or less perplexity and concern to engineers. It has become so intensified of late, owing to the frequency of this type of maritime casualty, that more thorough investigation of the causes and earnest endeavour after securing a remedy are now being thoroughly instituted. The paper by Mr. G. W. Manuel, on "Crank and other Shafts used in the Mercantile Marine," read at the Naval Architects' Congress in July last, and fully reported, together with the valuable discussion it evoked, in our September issue, was the means of elucidating many of the causes of breakages and their prevention, and in the discussion the remarks, among others, of Mr. Milton, of Lloyd's, Mr. Thornycroft, and Mr. Seaton, were specially instructive. It was on that occasion stated that 90 per cent. of the accidents to shafting occurred to tail-shafts. This high mortality in this kind of shaft has been matter of deep concern to many engineers, and of course to shipowners, and a considerable number of inventions designed to prevent or minimize the evil have been introduced with more or less success. At the special request of the British Committee of the Bureau Veritas, a report on the whole subject has been prepared by Mr. John Gravell, which is a further valuable contribution to the solution of a difficult problem. Mr. Gravell's enquiry was a somewhat extended one, and in prosecuting it he found that, while there appears to be considerable difference of opinion both as to the causes of and the best means of preventing these accidents, all are agreed that one of the chief causes is the galvanic action which takes place when liners of brass or gun-metal are fitted to work in *lignum vitæ* bushes in the stem tube or stem brackets. He summarises the causes to which various engineers attribute the breaking of tail shafts, classifying these under six heads:—(1) Defects in material, or (2) in design; (3) bending and stresses; (4) vibration; (5) hammering of the sea on overhung propellers; (6) corrosion near ends of brass liners. Any of these causes of course may act in combination with one or more of the others. When shafts are forged from scrap, this is sometimes iron and partly steel, and the steel perhaps of different qualities, so that shafts constituted thus can in no way be homogeneous. Mr. Gravell, therefore, recommends ingot steel, not exceeding 30 tons tensile strength, and forging under a hydraulic press in preference to under a steam hammer, and that in any case they should be well annealed. He mentions, however, that shafts made of cast-steel with forging have also given satisfaction. This important point, it may be remembered, was prominently adduced by Messrs. John Spencer & Sons, of Newburn Steel Works, who wrote after the reading of Mr. Manuel's paper, to take exception to that gentleman's statement that crank and other shafts of cast-steel, machined direct from the mould, after being annealed, generally resulted in failure, as the material was wanting in that ductility and toughness necessary in crank and other shafts, and he thought they were now seldom used. Messrs. Spencer maintained that for twenty years they have made large numbers of these shafts, and they had never heard of failure. They had on the contrary given every satisfaction,

and they always had such shafts in hand and were sending them out daily. As regards ductility and toughness, all their shafts had to meet the requirements of such societies as Lloyd's, Bureau Veritas, as also the Board of Trade. There seems little reason why, if proper precautions are taken to exclude injurious substances from the ingot, cast-steel shafts should not be as good as forged shafts as usually made; but for tail-shafts especially there seems to have been too little experience with the cast-shafts to warrant unquestioning adoption. Defective design as a cause of shaft-breakages does not, on the whole, often present itself, and the simplest and most effective way of meeting this, as well as the unequal stresses brought upon shafting which gets out of line through the variability of the loads carried by vessels hulls, is to allow such a margin of safety in the diameter and strength of the shafting as may be shown by experience to be ample. Vibration, due to powerful machinery conjoined to lightness of structure in the after-part of the hull, is also instanced by Mr. Gravell as a possible contributory cause of breakages in tending to "produce molecular changes in the metal, and to make the shaft brittle." There have certainly been instances in which extra strength given to the hull at the after-part has been assigned as the reasons for immunity from tail-shaft breakages, but surely vibration—from whatever cause arising—can only be of any marked detriment, when associated with and producing the action of "hammering," another cause of deterioration and fracture given by Mr. Gravell, and of much greater moment. With propellers overhung, as they mostly are nowadays, and with the after-bearings allowed to work or wear loose, bending strains are set up, and the action of a rough sea causes the shaft to knock or "hammer" in its bearings, thus tending to induce molecular change and ultimate fracture in the shaft.

Closely associated with and largely contributing to this cause of tail-shaft troubles there is another matter which Mr. Gravell's report ought to have made specific mention of, as being probably at the bottom of much of the evil. Some attention was directed to it in the course of the discussion on Mr. Manuel's paper. This is the variability in the draft, and in the immersion of propellers, of the "tramp" class of steamers, where, indeed, mortality in tail-shafts runs high. Very many of these vessels, engaged in very heavy trades, make voyages of hundreds of miles in ballast, the propeller being only partially immersed, often, indeed, with a following sea, it may be wholly out of water. The engines, in such circumstances, race, of course, and the tail-shaft is almost free from stress, but when the propeller again enters the water the shafting is thus subject to a violent wrench, which is far more serious than other stresses. The grievousness of this cause of fracture in tail-shafts is such that there is now some talk of asking the Board of Trade or the registry societies to assign a minimum draught below which vessels shall never be propelled. Whether this may be necessary or desirable is doubtful, but there can be no doubt that for vessels intended to be frequently running light, in ballast only perhaps, an extra strong stern shaft is necessary. The remaining cause of tail-shaft trouble considered by Mr. Gravell—viz., corrosion—is by far the most important of the evils at work, and the reasons for its existence, as well as the means for its abolition, receive considerable attention. It has been long recognised, and very generally conceded, as the report points out, that the main source of this evil—in shafts at least lined with brass or similar metal, and where sea water is freely admitted to act as a lubricant in conjunction with strips of *lignum vitæ*—consists in the galvanic-action set up between the brass liners and the iron or steel shafts they are meant to protect. The salt water acts as the agent setting up galvanic action, and the corrosion resulting, in the form of a groove round the circumference of the shaft has mostly shown itself where the brass liners end on the shaft. The various devices introduced with the view of preventing or minimising corrosion must be for most part well known to our readers. The tapering or chamfering away of the abrupt end of the liner was a great improvement in this respect. Mr. D. B. Morrison has materially improved on this by forming the ends of the liners in zig-zag or "scolloped" fashion, with the view of distributing corrosive action over a greater length of the shaft, and prevent the formation of a groove round the circumference in one plane. Mr. Thomas Mudd uses a "protective sleeve" of indiarubber which fits over the entire exposed length of shaft and liner ends, and another somewhat similar expedient consists in winding the shaft between and over the liner ends with marline well soaked in red-lead or Stockholm tar, and the whole firmly wrapped round with well-painted canvas. Success has attended the application of Mr. Mudd's device in very many steamers, and it has less objection on the score of inconvenience, when shafts have to be examined, than the marline and canvas arrangement. Another means suggested is the carrying of the brass liners the whole way within the stern tube, the joints being made watertight by brazing or soldering, and Mr. Manuel, in his paper, referred to cases where such over-all liners had been

fitted in three pieces, and given satisfaction. But for the difficulty of manufacture and fitting, the best method, of course, would be to make the liner in one entire piece. According to Mr. Gravell, "even with this expensive arrangement water has been known to get through the pores of the metal and corrode the shaft underneath where such corrosion could not be seen." This is certainly somewhat remarkable, and would seem to support those who contend that water should be excluded from the bearing and stern tube entirely, and some other means of lubrication adopted. Several devices for accomplishing this are referred to, one being Cedewall's patent "protective box," which has been applied to Swedish-owned vessels with distinct success. Briefly, the box is bolted to the forward face of the propeller boss, and contains a movable ring or gland which is pressed, and runs watertight, against the after-end of stern tube, thus preventing the admission of sea-water. The tube is filled with olive oil, and grooves are cut to let the oil get to the bearings and air to escape. The oil is prevented to a great extent from extending by the gland, and what loss there is is made up from a cock and pipe on the watertight bulkhead at fore-end of tube. Other working, he says that when fitted with brass or gun-metal liners working in *lignum vitæ* bushes, all parts of the shaft between and beyond the liners should be thoroughly protected from contact with sea-water; when not fitted with such liners, either some such arrangement as Cedewall's should be adopted, or if the shafts work in white-metal bushes, these should be of ample length, and well lubricated by either grease or water. But the most important thing is that the portion of shaft inside the stern tube, and between the propeller boss and outer end of tube should be protected from any contact with salt water.

devices referred to are: fitting the annular space between the shaft and tube with tallow, or a mixture of tallow and rape or mineral oil, and providing means for keeping the space quite full of grease and for excluding sea-water; running the shaft without liners of any kind on long bushes of white metal well lubricated with water or grease, a plan which has been adopted with complete success by the builders of torpedo craft. The recommendations Mr. Gravell finally makes almost obviously follow from the above considerations. As regards the material and make of shafts his suggestions have already been stated in this article. As regards the means of protection in

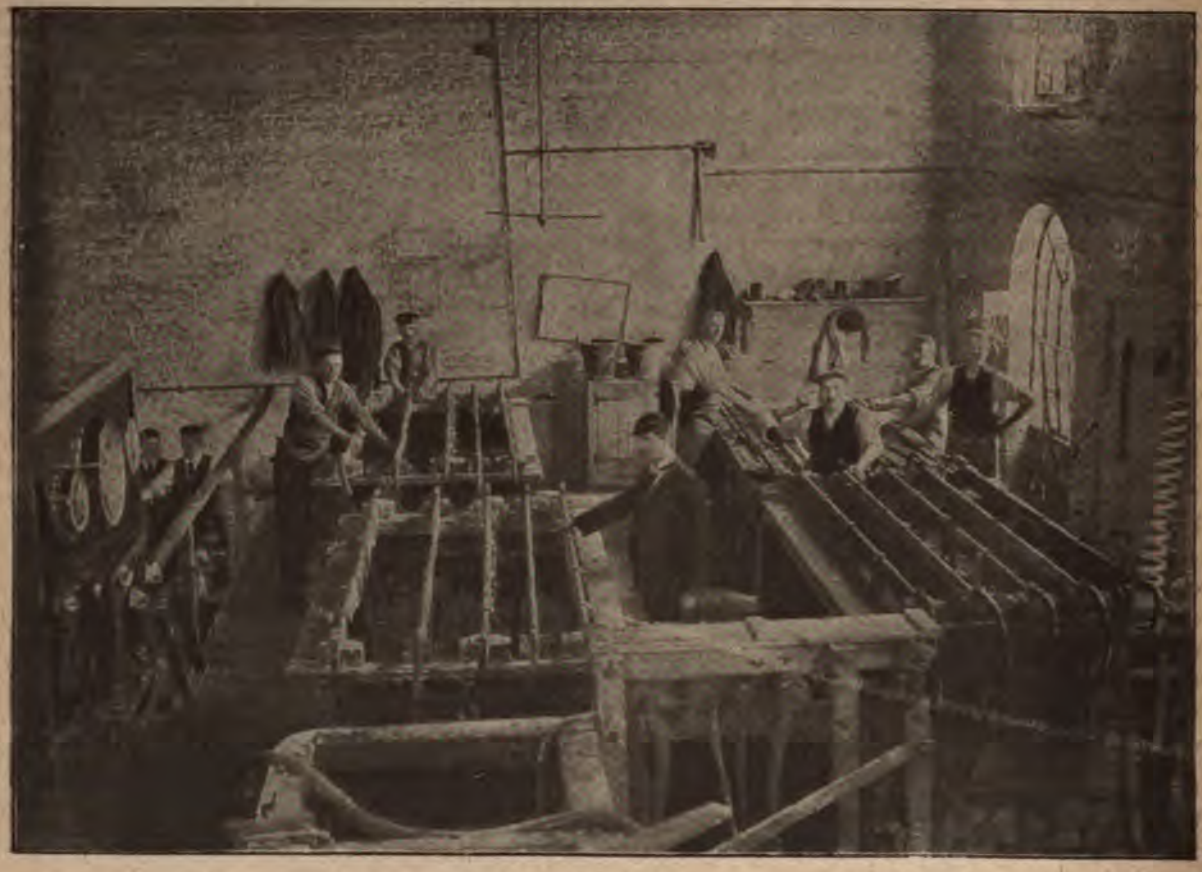


Fig. 1.

THE COWPER-COLES COLD GALVANIZING PROCESS.

ZINC surfaces, after brief exposure, become coated with a thin film of oxide—insoluble in water—which adheres tenaciously, forming a protective coating to the underlying zinc. So long, therefore, as the zinc surface remains intact the underlying iron is effectively protected from corrosive action. Sea air, charged as it is with brine, is more destructive in its action upon galvanized ironwork, forming a soluble chloride. As zinc is amongst the metals most readily attacked by acids, ordinary galvanized iron is not suitable for positions where it is much exposed to an atmosphere charged with acids, sent into the air by some factories, or to the sulphuric acid found amongst the products of combustion of coal and gas.

The efficient protection of steel from chemical action is becoming a matter of considerable importance now that steel is so extensively taking the place of wrought

Fig. 2.

iron, as owing to the increasing cheapness of steel, ironmasters are dispensing with the puddlers' services, and using steel instead of puddled bars for rolling down into sheets, angle iron, &c. Thin steel plates are largely used for constructing the hulls of small craft, such as torpedo boats; but corrosion is found to be more marked in steel vessels than iron, for which reason some engineers still object to its use, or have the steel galvanized. Sir George Findlay mentions in his book "The Working and Management of an English Railway," that the corrosion of steel rails as compared to iron rails is in the proportion of about five to four, and he has found in tunnels and manufacturing districts where sulphurous and other acid gases are present in the atmosphere, the life of the rail is shortened to a material extent. The best preservative for iron is a covering of an electro-positive metal, as it is necessary for rapid rusting to take place to have a substance in contact, such as rust or oxide of iron, which acts as a negative element to the iron, and aggravates the process of rusting. The durability of painted ironwork, therefore, largely depends upon the surface of the metal being properly cleaned and prepared. Engineers recognize the fact that the best results are obtained when the paint is applied direct to the iron surface before it has had time to rust, as the rust prevents the intimate contact of the paint and induces chemical action, which causes the paint to peel from the iron. It has been found that this desirable end may be obtained at a very small cost by "zinc flashing" that is, coating the iron or steel, after pickling, with a thin coat of zinc which will retain a perfect surface for receiving a coat of paint until such time as it can be applied. A special feature of the cold process is that plates of very large dimensions can be readily zincked on one or both sides, which is a matter of some importance now that plates some 60 ft. in length are being put in the straight line of steamers' hulls. The frames of such craft as torpedo-boat destroyers can also be galvanized after riveting up. The first cost of a plant having a bath capacity of 6,700 gallons, 30 ft. by 6 ft. by 7 ft., is found to be little more than a hot galvanizing plant having a bath capacity of only 10 ft. by 4 ft. by 4 ft. 6 in. outside dimensions. The cost of such a bath is £125, and would hold twenty-eight tons of zinc, which at £17 per ton—£476—to keep this large quantity of zinc in a molten condition, entails a heavy expenditure in fuel, the thickness of the iron bath averaging more than 1 in.; moreover the iron galvanizing baths are also a constant source of annoyance and expense.

The plant for the Cowper-Coles galvanizing process consists of a series of steel tanks. The work to be zincked, after having the grease and scale removed, is placed in a steel tank containing the zincking solution through which a current of electricity is passed, the thickness of zinc deposited usually being about 1 oz. to the superficial foot. The solution, or electrolyte, as it becomes exhausted of zinc is circulated through regenerating tanks by means of a small donkey pump or steam injector, the connections being so arranged that the regenerating tanks can be charged and discharged alternately. In the regenerating tanks is placed from time to time zinc dust which is dissolved by any free acid present. There is no dross to be got rid of in this process, as the zinc dust or tutty which is employed is entirely dissolved without waste. Tutty (Persian *tuteza*) is a greyish amorphous substance obtained as a sublimal product in the flues of zinc smelting furnaces. The term tutenague is a term sometimes applied to crude zinc or spelter.

Fig. 3.

Regenerating tanks worked either by injectors or pumps have been erected at Messrs. Laird Brothers, Birkenhead, the Thames Ironworks and Shipbuilding Co., and Messrs. Maudslay, Sons & Field's works. Fig. 1 gives a general view of a Cowper-Coles galvanizing plant as erected at Messrs. Maudslay, Sons & Field's works.

To test the adhesion of the zinc applied by the Cowper-Coles process, tubes have been jumped down to less than a quarter of their length, when the zinc was found to be intact. Figs. 2 and 3 are specimens of solid drawn zincked steel tubes after being reduced under the steam hammer. A steel pipe, heated in a sand bath to a temperature of 600 deg. Fahr., on being removed from the hot sand, showed no signs of blistering.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The New Elbing-built Steamer for the North-German Lloyd Company.

So much interest has been excited in shipping and general circles by the *Kaiser Wilhelm Der Grosse* that it may be well to inform the readers of THE FLEETS OF THE MAIL LINES that there is, and for some time has been, in the window of No. 2, King William Street, Mansion House, the new City office of Messrs. Keller, Wallis & Co., the agents for the North-German Lloyd Company, a model of the *Kaiser Frederich Der Grosse*. It is a very fine specimen of the modeller's art, being something like 15 ft. in length. From it we see that the coming vessel has two pole masts and three funnels. The saloon skylight appears to be between the two forward, and the engine-room skylight between the two after funnels. The vessel has two stockless anchors, and is fitted with bilge keels. Her rudder is wholly below the water-line like that of the Vulcan-built vessel. There is a very short well aft of the forecastle, and there is no well at all aft, the upper deck being continuous. She has a couple of breakwaters on the forecastle, like her companion. But her spar deck is more closed in, the deck-houses on this level extending right across the vessel for her full length. The vessel herself was launched at Elbing on the 5th October, and is to make her maiden trip in the April of next year. Details as to her size were tabulated last month. But perhaps I may repeat that her displacement is to be 17,000 tons at load draught against 20,000 tons in the *Kaiser Wilhelm Der Grosse*. She is also some 16 ft. shorter, 2 ft. 2 in. narrower, and 6 ft. shallower than that vessel. She is fitted with engines of the quadruple-expansion type, but arranged on a very unusual plan. Each of her two three-bladed screws is driven by a set of three-crank engines with five cylinders. There will be two low-pressure cylinders in each set of engines. The shafting will be hollow.

A Great Cargo Boat.

Three days after the big mail steamer was launched at Elbing, the firm of Blohm & Voss, at Hamburg, put the *Pretoria* into the water for the Hamburg-American Line. She is a twin-screw steel cargo vessel of some 23,500 tons displacement at load draught. She is a German edition of the *Pennsylvania*, launched just over thirteen months previously by Harland & Wolff, at Belfast, for the same owners. Thus in about a week we had the demonstration of speed by the *Kaiser Wilhelm Der Grosse* from the Vulcan Company's yard and the launch of the other two monsters. This is a very good object lesson for us. We see that Germany has two steamship companies of vast size and of great wealth, who are determined to be in the absolute fore-front of the day with their vessels, be they built for mail or for cargo service. We are also reminded of the fact that what our leading shipbuilders achieve to-day will be done—at a price—by the Germans next year.

This will give us food for reflection of a very useful, if not perhaps very cheerful, kind.

But to return for a moment to the *Pretoria*. She and her sister, the *Pennsylvania*, are vessels of a different type to the White Star cargo boats which most nearly approach them in size. The British vessels are pure cargo boats, carrying no passengers and having a sea-speed of some 11 knots. The Hamburg boats are faster, and have accommodation for an immense number of passengers. The numbers are put at 204 saloon, 124 intermediate, and 3,500 emigrants. That is to say, accommodation for not far short of 4,000 souls will be provided on board this vessel when the numbers of her crew are considered. We are not told what her accommodation in life-saving appliances may be. Of course the chances of a sudden necessity for abandonment in mid-Atlantic are somewhat remote in the case of a properly sub-divided twin-screw steamer of modern build and of low engine power in comparison with her bulk. Yet experience has shown that such cases do occur, and their recurrence should be within the view of designers, builders, and owners of such steamships. The number of persons aboard the *Pretoria* may be, according to what has been said, almost double that which is intended to be shipped by the greatest mail steamers. These latter are fitted with boats according to Government requirements, which are heavy enough from an owner's point, no doubt, but they have not an excessive number. Has the *Pretoria* double the number of those carried by her mail sisters? I suppose forty persons is a fair average number to allow for each. That would mean that a hundred boats would be needed to provide boat room for her maximum number of passengers and crew. This is, of course, impossible, as the length of the ship would not be sufficient to find davit room for anything like the quantity. This subject, however, is one which must be mentioned, and mentioned only. It would be impossible to follow it out. The mind refuses to contemplate a sudden catastrophe under such circumstances, and to think of the struggling regiments of undisciplined men, women, and children who would never have a chance of even getting near a boat.

Two New Mail Steamers

have been added to the British Fleets of the Mail Lines in the month of October. Both started on their maiden voyage to the East in the same month. There apparently their similarity ceases. One of them is the *Egypt* of the P. & O. Company. She is a sister to the same company's recent boat *India*, and, like her, is built at Greenock by Messrs. Caird & Co. I have not had the good fortune to see her, but the omission is quite remedied by the fact that I had the opportunity of reading an account of a visit to her at the London Docks by a correspondent, who published his adventures in the *Daily News*. This gentleman writes as an outsider, and as one who takes notes of what is shown him. He ventures on few original remarks, save of wonder and awe, and what he saw he had the advantage of seeing in the company of Sir Thomas Sutherland, the chairman of the company. The account runs to a column and a half, and it contains much useful information as to many other things beside the *Egypt*. For example, we are given lists of the stores of the vessel. These, apparently, are a never-failing source of interest to the readers of the daily press. We have seen, in papers and magazines, lists of such things furnished by most of the chairmen and other officials of the big lines. Then we are given a considerable discussion on the life and genesis of the steward. This is put in the form of question and answer so as to be intelligible to the meanest capacity, but there is exceedingly little matter in it all the same. When the first column of the article is long past and the end approaches, I come to the first solid fact which is likely to interest my readers. It is that the *Egypt*, of the great mail-and-bullion-carrying line, at least, has a mail bullion room. This is a fact worth noting, because it was recently made known in the Law Courts that one of the company's ten-year-old mail-boats had not the advantage of one of these useful, and, one would imagine, necessary contrivances. The *Daily News* correspondent says nothing of this, however. One learns, too, that the vessel has an hydraulic installation, as well as electric light, but as to main engines or such matters, a careful vagueness is successfully cultivated. Still, one can draw inferences that this steamer *Egypt*, specially built for the world-famous P. & O. Company's new accelerated service in the Diamond Jubilee year, is a single screw ship of no very startling dimensions, for her shafting is only 150 ft. long as against a couple of hundred in Atlantic boats built a good while ago. There seems to have been some idea that reliance on a single shaft is not altogether prudent, present to the minds of the mentors who took this correspondent round. So they told him of the infrequency with which shafts break—oh, that underwriters and chief engineers could agree with that—and then they even went so far as to show him "the spare shaft" which they carry in case of emergency. This is, indeed, a new departure, and one which should make the *Egypt* ever memorable to marine engineers. But what cargo space and weight are here sacrificed by this princely company in their anxiety to avoid the possibility of breakdown! The single screw shaft of such a vessel as the *Egypt* is no trifle to carry in itself; when a second has to be carried it is a prodigious matter. One hundred and fifty feet of steel shafting, we understand, with all its collars and thrust block rings, all in duplicate! What it must mean! I am consumed with desire to see this wonderful ship and find out where all this spare gear is carried, and what means are taken to aid the engineers in their great task of changing shafts—not lengths of shafting—at sea. Changing short lengths of shafting in low-powered cargo boats used to be considered a heavy job by marine engineers.

The other vessel I referred to is one of an entirely different character. She is the *Derbyshire*, and belongs to the Bibby line, trading from London and Liverpool to Rangoon, *via* Colombo, and is the sixth vessel turned out for that service by Messrs. Harland & Wolff. She is, shortly, an improved

Staffordshire. Like that vessel and the earlier vessels of the line in general arrangement, she has greater size, the public appreciation of Messrs. Bibby's attention to their wants warranting these enterprising owners in giving more and more accommodation in each succeeding ship. The present vessel, which is just 630 tons larger than her last predecessor, will seat a hundred and twenty passengers in her main saloon, and for her maiden trip every berth is full with, as the chairman was careful to remark, paying passengers, and not what are called across the Atlantic "deadheads."

In appearance the *Derbyshire* is like her sisters. Four pole-masts and one lofty funnel, a straight bow and an elliptical stern. She is propelled by two sets of three-cylinder triples, driving twin screws. She has four boilers, two being double-ended, and two single-ended. The double-ended have eight furnaces each and the single-ended four. The draught is natural, though means are taken to supply air to every part of the vessel by mechanical ventilation. Messrs. Wilson & Pirrie's steering gear is fitted. There is a large installation for frozen meat, the refrigerating apparatus being by the Linde Company. In fact, everything about the ship is designed for the comfort, safety, and convenience of passengers and cargo. This vessel is the property of an unsubsidised line which manages to make a living and build these ships of the best class of the day for a service whose objective is a comparatively insignificant place like Burmah, while heavily subsidised lines to far more important places in the neighbourhood give new vessels of a type that might have passed muster ten years ago. In ten years time—though it is ill to prophesy—the *Derbyshire* and her older sisters will still be a valuable property, and capable of earning a return in any trade. What will be said of the other ships? Detailed accounts of the *Derbyshire* will be found elsewhere in this issue.

The White Star Company

has, whilst the great *Oceanic* is completing, restored to Great Britain her lost lead in big cargo boats. The *Cymric* was launched from the Queen's Island yard on October 12th. She is, of course, twin-screw, and her engines, though the boiler pressure does not exceed that of the company's *Delphic*, are of the quadruple-expansion type. Her size, however, is her most striking point. Her displacement at load draught will exceed 23,000 tons, whilst her length is 600 ft.—approximately that of the great Cunard mail boats, and 40 ft. greater than that of either the White Star Company's own *Georgic*, or of the Hamburg Company's biggest vessel, the *Pennsylvania*. The exact length of the new Hamburg boat *Pretoria*, earlier mentioned in these notes, is not yet published. But as she is spoken of as the *Pennsylvania's* sister we may assume that it is not more than 460 ft. In beam the *Cymric* is still surpassed by the *Lucania* by about a foot. She is a couple of feet bigger in this dimension, however, than the other "camels of the sea."

Two Old Ships.

The strike and lock-out in the engineering trade has inflicted, and will inflict for long enough to come—though I should be very sorry to say anything which could be construed into a suggestion as to the rights and wrongs of this most unfortunate dispute—great trouble upon one of the leading industries of this country, and upon all, directly and indirectly, connected with it. Yet it is an ill wind that blows no one any good, and when the country suffers it would be strange if the South-Western Railway did not benefit. This company has all the luck that is going, whether it be the traffic of foreign steamship lines, which take away British trade, or that of suburban race meetings. Its latest piece of luck is the opportunity which has been afforded it of renting its old paddle boat, the *Southampton*, to the Messrs. Yarrow as a barrack for their workmen during the strike. The old ship is thirty-seven years of age, having been launched as long ago as 1860 by the Palmer Company, of Jarrow. After a career of twenty years she was lengthened, and received new engines and boilers. Nine years later she was again re-boilered. But her day is altogether past, and save for such a job as this no employment, at least of a profitable kind, would be likely to await her. The same cause has given a temporary job to a still older and much more famous craft. I refer to the *Lady Jocelyn*, which was illustrated in the *Daily Graphic* in the middle of October. The letter-press account of her in that paper, as far as it goes, is probably accurate. No doubt her paint is a sight to see, and makes the observer "wish to turn a hose on her." But the glories which were recalled by the port sanitary authority were in their day real indeed. The "old *Lady Jocelyn*" is no less than forty-five years of age, though it may be ungallant to mention the fact. She was built under the name of *Brazil* by the old firm of Mare & Co., of Blackwall. She was one of the auxiliary screw fleet of the General Screw Steamship Company, and sailed, as the writer in the *Daily Graphic* rightly states, to Australia. The line was before its day, and the sailings were discontinued. Then she had a period of employment under a foreign flag. But the Peninsular line in which she was run was not successful, and she returned to the Red Ensign. Again she found employment. This time it was under charter to the unfortunate Galway Line. I mentioned this line only the other day in reference to the recent death of Mr. Orrell Lever. The Galway Line, as has often been stated, was under a contract to run to St. John's, Newfoundland, on the shortest Transatlantic route possible, in a fixed time, and had to maintain an average speed at sea which only the best ships of the day could hope to realise. Even the new fast paddle boats, specially built for the service at Jarrow, failed lamentably in the endeavour, and how was a poor auxiliary screw, constructed for the long stretch to the Antipodes, to hope to do better? She did not make the voyage in contract time, it is true. But she exists to-day when the last of the specially-built Galway boats has long ago either become a wreck or been sold to the ship knacker as old iron. The *Lady Jocelyn* then had her engines removed, and has done good service as a sailing vessel for the firm of Shaw, Savill & Albion. Her original tonnage was large for her day, being 2,250 gross and about 1,650 nett. Her length between perpendiculars was 254 ft., and her beam 39 ft.

The Dock Question.

At Bremerhaven, a large new dock has just been opened. It is called the New Kaiser Hafen, and is an extension to the northward of the original Kaiser Hafen, constructed some 20 years ago. The cost of the new work amounts to three times that of the old. There are in it 30 acres of water space, with a mean depth of over 33 ft. The quays are upwards of a mile in frontage, and have convenient railway facilities.

There is a dry dock of a length of 656 ft. and a breadth of 82 ft. This is claimed to be the largest dry dock in the world. I do not quite see how this claim is to be supported, as the great dry dock at Southampton, opened by the Prince of Wales a couple of years ago, is 750 ft. long and over 87 ft. wide. At all events provision has been made at Bremen for the recent development of size in ships, as the wet docks are available for vessels 656 ft. long and 90·8 broad. They will thus take either of the new North German Lloyd vessels, but would not manage the great steamer now building at Belfast. Though the new Kaiser Hafen is primarily intended for the use of merchantmen, it may also be of benefit to warships, and accordingly the German Government contributed towards the cost of its construction about one-eighth of the total expenditure, which amounted to little short of a million sterling.

The Docks Committee of the Bristol Town Council have submitted to the full Council plans for the improvement of their port, which, if carried out in their entirety, will involve the expenditure of upwards of a million and-a-half sterling. There was some little doubt as to where the new extensions had best be placed. Sir John Wolfe Barry was consulted, and he recommended a site at Firefly Rock, Portishead. But it seems to be agreed, that, in view of considerations of land transport facilities Avonmouth is more desirable, and so the idea is to build a new dock with a water space of 40 acres, and a depth of 30 ft. there. There will here be 5,100 ft. of quay space. This dock will have a graving dock 810 ft. long adjoining it, and will be entered from the Channel by a lock 850 ft. long and 90 ft. wide. It will also have a connection with the existing system of dockage. Besides this, a pier, or landing stage, for the use of vessels drawing up to 16 ft., will be provided. This will be approachable in almost any state of the tide and will have sidings communicating with the existing lines of railway.

Amongst the expenses necessitated, it is pointed out by the Committee that their scheme will involve the removal of the lighthouse owned by Trinity house, and, of course, the erection of a new one in its place, as well as the diversion of certain lines of railway.

A long discussion took place in the Council when the scheme was submitted for approval, and indeed, that is not surprising when it is noted that the expenditure entails an annual charge of

£50,000 for interest on the million and a half proposed to be spent spent. This means a burden on the City rates of no less than a shilling in the pound in the event of a return not being made by the attraction of traffic. An alternative scheme for the dockisation of the River Avon was not appreciated, and eventually it was resolved that a Bill to give the Council power to undertake the proposed works should be promoted during the ensuing session of Parliament.

The enterprise of the Liverpool firm of Elder, Dempster & Co., which controls the West African trade and directs the operations of the large fleet of general cargo steamers belonging to the African Steamship Company, has, of course, given the required fillip here. We saw last month the difficulties which this firm's comparatively small steamer *Memnon* had at docking at Bristol after her salvage service in the Atlantic. The steamer is only 320 ft. long. The firm's new steamer *Monarch*, recently built at Middlesbrough by Sir Raylton Dixon & Company is no less than 483 ft. in length over all. If the proper facilities are granted, Mr. L. Alfred Jones, the managing partner of the firm has practically promised to give a regular Atlantic service to Bristol by boats of this type, and, of course, Bristol would benefit by the building up of an important *entrepot* trade. Other developments, too, by the same firm are suggested. Amongst these may by mentioned a proposal to make an incursion into the Cape and East African domain. If that comes off we may see a good deal of excitement developed.

From private, but I believe not ill-informed, sources, I learn that it is not expected in local circles that this scheme will really come to fruition. There was a previous scheme some four or five years ago which was still-born, owing to the jealousies and squabblings of the local railways and similar interests. It is believed that neither patriotism nor true self-interest have been learnt by those affected in the period since the last attempt at improvement was made, and that for that reason the present scheme will share a similar ignominious fate.

The Mersey Docks and Harbour Board, as befits an authority of its standing and riches, has under consideration a very expensive but very comprehensive scheme, which reduces even the Bristol ideas into insignificance. The alterations and improvements referred to will involve the expenditure of between three and four millions of money. They are calculated to modernise the most ancient part of the Dock Estate and to render productive of dues, and of facilities to customers, the least convenient and least productive of their docks. The North Docks are modern. The South Docks have been modernised. It remains to deal with the central part of the Estate chiefly, though the other parts of the estate may not be altogether forgotten.

The Stanley Dock is, under a scheme already in course of execution, being partly filled up, and the tobacco storage of the port centred there in stores now in course of erection to the relief of the bonded stores at the Albert and King's Docks. The entrace to the Coburg Dock and also of the Union Dock to be increased and improved. The Brunswick Dock is to have a new river entrance, and to be made available for larger ships. Four new branch docks are to be constructed, two on the west side of the Queen's Dock, and two on the west side of the Wapping Dock, whilst the Queen's and Wapping Docks themselves will be deepened and the connection between them improved. At the North end a branch dock is to be built on the site of the Sandon Graving Dock, leading out of the east quay of the Huskisson Dock, whilst the Sandon Dock itself will be thrown into the area of the Sandon basin. Then graving docks are proposed to be built as follows:—One of 630 ft. in length on the site of the Queen's half-tide dock, another 1,000 ft. long and 90 ft. wide, leading eastward from the north-east corner of the new half-tide dock now being constructed in the neighbourhood of the Sandon dock. A third, 620 ft. in length, on the site of the existing Brunswick Graving Dock. Double story sheds and railway facilities will be provided wherever convenience demands their presence. When we regard the enormous strides which have been made of recent years in the size of vessels and the numbers of vessels of large type which are so constantly being turned out we feel that there is nothing extravagant in the Dock Board's idea of building a thousand-foot graving dock. Especially is this so when it is remembered that the programme will take ten years to complete. We now have a vessel, preparing for Liverpool owners, whose length exceeds 700 ft. Ten years ago the vessels of 600 ft. were as yet unordered even if an intention to build them soon might have existed in the minds of far-sighted shipowners. If a rate of increase of a hundred feet in ten years were to be maintained we should find that this dock was not so much before its time, and ten years is not much in the life-time of a dock, though it makes a good deal of difference to the more feminine ship. The first Liverpool dock had a career exceeding a century and a quarter and then only ceased to exist because the site was wanted for improvements. Another century and a quarter will see our descendants well on in the twenty-first century, and who will be bold enough to suggest the limits of size that will be reached in those days?

The measure of convenience attained by so large an expenditure is one which must be discussed in a later issue, when the details of the scheme have had time for ventilation. There seems to be a tendency amongst some of the class of shipowner which owns the smaller vessels to state that they are being neglected by the Dock Board and that their small conveniences are being removed. But it does not appear as yet that they have suffered, or are likely to suffer to any very appreciable extent. Certainly no scheme could be evolved which would not meet with some criticism from some quarter, and the present suggestions seem to have been well received in the most important quarters.

Publications.

"The Guide to South Africa," published by Messrs. Sampson Low & Co., for the Castle Line, has, in its 1897-8 edition, just out, grown to be quite a large volume. It is really an encyclopædia to the South African countries and all that concerns them. It is provided for the use of tourists, sportsmen, invalids, and settlers, as we are told on the title-page. That is to say, in other words, for the use of the travelling constituents of the Castle Line. But when we come to look within its pages to see its comprehensive information regarding the resources of South Africa, and the development of those most go-ahead countries, we find that it may be equally useful as a work of reference to the stay-at-home writer. I say "to the writer" advisedly, for a man of any other occupation would be so fascinated by the account of the prospects, sport, and climate of South Africa, that he would manage somehow or other to get a run down thither. The journalist has no chance of getting away. A very interesting chapter is that relating to the Transvaal, and the recent troubles there. But matters are so simply and concisely stated that, whatever may be the colour or strength of the reader's political ideas, he will find nothing at which he can feel anything but agreement.

The "General Steam."

Some interest will attach to the report of the General Steam Navigation Company, it being one of our oldest fleets. No new vessels have been acquired during the period under review, but four have been disposed of. These are:—

Hoboken,	paddle,	built by Napier's	in 1873,	4 13tons.
Stork	screw,	,, Gourlay Bros.	1874, 781	,,
Martin	,,	,, Mitchell	1875, 959	,,
Hawk	,,	,, Gourlay Bros.	1876, 648	,,

The aggregate tonnage so disposed of amounts to 2,801 tons, and leaves the fleet at forty-four vessels comprising 41,844 tons.

New vessels have been ordered of Messrs. Gourlay Bros., of Dundee, to whom the company have already been good customers. These are to be fast, but the mistake—a very great one I feel sure—has been made in choosing the paddle as the form of propulsion. The day of the paddle is past, and the General Steam of all people ought to try to be up to date with its new tonnage.

The New Record Breaker.

The performance of the new North German Lloyd steamer *Kaiser Wilhelm der Grosse* has led to a vast amount of ink-spilling and of discussion. Some people say she is the fastest vessel on the Atlantic, others say she is not. Some say that we have lost our maritime supremacy through her advent because she was built in Germany, whilst a writer in the *Daily Mail* has actually claimed her performance as a triumph for British shipbuilding—so I am credibly informed—because he has discovered *that she was built and engined at Belfast*. After such drivel there is little to be said. That she is the largest vessel at present at work on the Atlantic is certain. Equally certain is it that she was put together and is owned in Germany. We cannot deny that whereas a few years ago all fast steamers in the world were under our flag, Germans, Americans and Frenchmen now all have their share. And their shares are increasing whilst ours seem

to be diminishing, and must be so, at least relatively. But when we have said that, we have said all. The *Kaiser Wilhelm der Grosse* is certainly a vessel of which all concerned may be proud. But she has done nothing to alarm us. She is built with the benefit of the accumulated experience of the world as it now stands in the building of big fast steamers. She is bigger than anything afloat. She is intended to beat anything now at work and with that object she has been given greater power than any vessel in the British Mercantile Marine. As faithful work and skilled design has been put into her it is not remarkable that she has proved herself fast. But that is all. Belfast is even now building for the White Star Line a larger vessel, though those concerned strenuously protest that she is not being built for speed. That we shall see. The British shipowner for a moment may feel that German enterprise has outrun his. But then he has the consolation of remembering that he has to flourish as best he can in spite of his Government, whilst the German Government by money and by legislation in every possible way fosters his rival. But the British shipbuilder need feel no slight here. The German shipowner goes to a German shipyard because the law of his country—by which he so largely benefits—makes him do so. Given the order, whatever it be, and no doubt the British shipyard could execute it.

As to the speed of the new vessel, I will briefly give details of her two outward and one homeward run as yet completed and will remark that her second westward trip, owing to bad weather, happened to be a trifle worse in time and in speed (both mean and of best day) than that of her maiden trip. But nothing beyond an allusion to the fortune of war is to be conveyed by this remark. I do not believe in the truth of that ungenerous reminiscence of the maiden trip of the *America*, the National Line record-breaker of fifteen years ago.

On her first outward voyage the *Kaiser Wilhelm der Grosse* captured the record between Southampton and New York, previously held by a Cramp-built American liner. On her first eastward trip she lowered the New York to Plymouth record, which was then in the possession of the Hamburg Line. She also on the maiden run took the record for a day's steaming to the westward from the Cunard Line.

Her best day's steaming to the westward was 564 miles. Returning she did a best day of 519 miles. The French mode of comparison as to maximum speed avoids all calculations as to the respective length of the days in each direction. It adds those two together. That makes a total 1,083 miles, which divided by 48 (the number of hours in two average days) gives the *Kaiser* a best speed of 22·57 knots. This is a very good best speed indeed. She has not, however, as yet touched the mean speed of the great Cunarders for a whole trip across the Atlantic.

DETAILS OF RUNS.

Westward :—	Left Needles.	Arrived Sandy Hook Lightship.	Passage.
No 1.	2 a.m., 21 Sept.	5.5 p.m., 26 Sept.	5 22 45
No. 2.	2.50 p.m., 13 Oct.	9.55 a.m., 19 Oct.	5 23 55

DAILY RUNS TO RUN EACH DAY.

		Total Distance.	Average Speed Throughout.
No. 1.	208, 531, 495, 512, 554, 564	2,864 miles	21·39 knots.
No. 2.	488, 532, 545, 542, 436, 512	3,055 ,,	21·25 ,,

Eastward :—

	Left Sandy Hook.	Arrived Plymouth.	Passage.
No. 1.	6 p.m., 30 Sept.	3.5 p.m., 6 Oct.	5 15 10

DAILY RUNS TO RUN EACH DAY.

No. 1. 367, 504, 500, 507, 510, 519. Distance 2,962 miles. Speed 21.91 knots.

It will be noticed that on her maiden trip she gradually worked up to her great performance at the end. On the next trip her early days were an improvement on those of the previous voyage, but she fell away at the end, owing, it is explained, to heavy weather. If this is so we have not yet seen her best speed by any means.

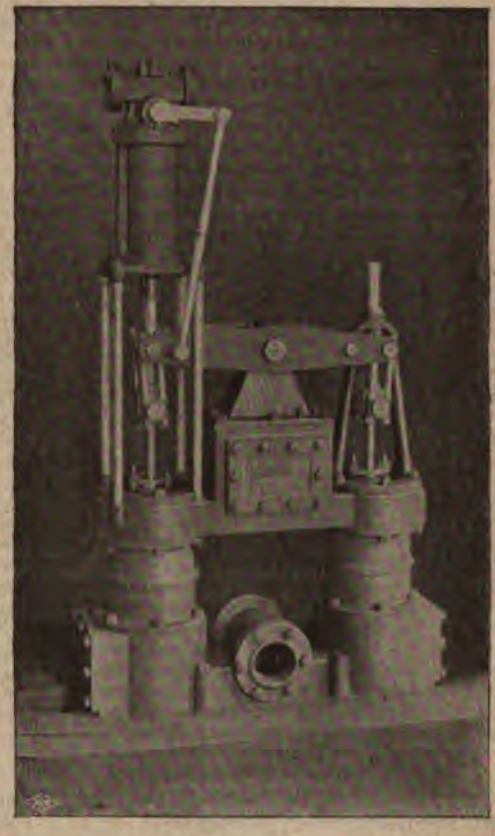
Previous records have always been noted in this column. It therefore seems superfluous to repeat them. But if any readers want any information on the point I shall be happy to supply it.

The Castle Line.

The new Castle Line mail boat is to be launched at Fairfield on 28th October. She is to be named the *Carisbrooke Castle* and will be in many respects an improvement even on the recent *Dunvegan Castle*. It will be too late in the month for me to give any details regarding it in the present issue.

THE DAVIDSON INDEPENDENT AIR-PUMP.

IN our Mersey Notes last month we referred to a special type of vertical air-pump brought out by Messrs. W. H. Bailey & Co., Limited, of the Albion Works, Salford, Manchester, which has been designed for use on shipboard, electric lighting and power stations, where economy of weight and floor space, combined with efficiency, durability, and general accessibility are of essential importance. In our present issue we are enabled to give an illustration, taken from a photo of one of these pumps, together with a more detailed description of its general construction, and special applicability for the purpose for which it has been designed, which will no doubt be of



interest to our readers. The accompanying illustration very clearly shows the general features of this pump, which, it may be added, is made on the Davidson principle, and, as will be seen, consists of two vertical single-acting air-cylinders, actuated by a vertical steam cylinder. The movements of the valve in the steam chest are in a horizontal plane, thereby avoiding all the irregularity of action of other pumps with vertical steam cylinders. The pump is noiseless in operation and runs uniformly at varying speeds, and will meet all the requirements of varied and severe service, whilst it can be made compound where greater economy is desired.

Pumps on the Davidson principle are largely used on shipboard in the English Marine and Mercantile service, for boiler feeding, as fire engines, and for ballast, bilge, and general ship's purposes, and are

highly appreciated for their simplicity and many advantages. This independent air-pump has been adopted on the United States cruisers *Bancroft* and *Chicago*, and other warships and steamers. It has not been the custom in this country to have an independent air-pump on board ship.

There are, however, numerous advantages to be derived from its adoption. In addition to its compactness of design—which is an important advantage for marine requirements—and its general efficiency, its speed can be varied to suit requirements, without affecting the regularity of working, whilst the pump can be started before the main engine, and run at any time in conjunction with the auxiliary machinery when the main engines are stopped, which is a very economical arrangement. The pump is also specially adapted for use in connection with modern high-speed engines for electric lighting requirements.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

The Deadlock in Naval Shipbuilding.

THE lamentable dispute in the engineering trade is now approaching a crisis, and it cannot be long before it is settled one way or another. The retrograde effect it is having upon Naval shipbuilding can easily be seen by reading the reports on the stoppage of work which has taken place in the Government shipbuilding yards and the private yards who have any Admiralty contracts in hand. Mr. Awdry's visit to Devonport dockyard is supposed to have been chiefly concerned with the shipbuilding programme, and the effect the dispute is having upon it. Whatever the optimists in the daily press may say, there is no doubt whatever that the national interests are being seriously affected. News, too, from the Continent tells us that the chief cause of the Japanese placing orders for cruisers in France is that they are afraid they will not get ships if ordered in England delivered in time. This seems very feasible, for no fault whatever has been found with the other warships which English firms have turned out for Japan. It was feared at one time that the material for the *Ocean* at Devonport would be delayed, but happily these fears have proved groundless. But the Admiralty have been obliged to ask Messrs. Armstrong to deliver their castings for the *Goliath*, building at Chatham, in the rough. The Admiralty indeed would seem to be the chief sufferer by this unfortunate business, for they are unable to spend the money which has been voted for shipbuilding, vessels partly built cannot be completed, and those that are finished cannot undergo their trials.

Work at the Dockyards.

Naval construction at the dockyards, it is calculated, will be thrown back nearly a twelvemonth owing to the cessation of work by the engineers. Up to the present the Admiralty have assumed a neutral position, and it has not become necessary to discharge any of the men employed on Government work, but if the dispute lasts much longer the Admiralty may have to abandon this position, and take measures for getting the nation's work under way, which may have very far-reaching consequences indeed. The whole shipbuilding programme for the year has been dislocated, and it is virtually impossible to lay down new ships because the material therefor is not forthcoming. At Chatham the trials of the *Illustrious* have been delayed, and the stem and stern posts of the *Goliath* have not yet put in an appearance. The launch of this vessel should have taken place this month, but it cannot be said now, with any certainty, when she will leave the building slip. The cruiser *Vindictive* is also waiting for her boilers, and no definite date can be named for her completion. The trials of the *Cæsar*, at Portsmouth, were late, and the *Canopus* has been launched minus her belt armour, and is all behindhand. The cruiser *Gladiator* also waits for her engines. The *Ocean*, at Devonport, waits for her castings and engineering fittings, and her launch has been indefinitely put back. The trials of the *Arrogant* were behind hand, and work on the engines of the *Furious* has been stopped altogether. The *Hannibal* is about the only vessel building practically unaffected by the dispute, Messrs. Harland & Wolff supplying her engines, work at this firm being still in full swing. The trials, too, of the *Griffin*, *Panther* and *Ernest* have been seriously delayed. To make up for the loss of time large sums of money will have to be spent. Our naval superiority is in danger, and it is high time this was clearly pointed out to both masters and men, and resort be made at once to arbitration or other means which will put an end to this regrettable state of affairs.

The Accident to the "Thrasher" and "Lynx."

The terrible accident which happened to the torpedo-boat destroyers *Thrasher* and *Lynx*, has been the subject of much discussion among naval engineers. It is an example of the fact that our engineers and stokers of our warships risk their lives quite as much as the combatant officers and men of a ship, although, perhaps, not in the same manner. The three unfortunate but brave fellows who have lost their lives behaved in the most heroic fashion. The fog through which Commander Travers steered his ship was so dense that the course could only be kept by dead reckoning. The evidence given at the inquest points to the fact that his ship was handled in seamanlike fashion. The look-out that was kept was a particularly keen one, and frequent soundings were taken, the commander himself remaining in active superintendence of the vessel. The *Lynx* appears to have followed the *Thrasher* and luckily was not injured to such an extent as was the latter. The courts martial subsequently held acquitted Lieutenant Armstrong of the *Lynx*, but found the charges partly proven against Commander Travers, but took into consideration the able and successful efforts made by the prisoner, after the stranding, for the safety of the crew and the salvage of his vessel, and adjudged him to be severely reprimanded and cautioned him to be more careful in future. They also expressed regret at the loss of life involved. The destroyer appears to have been going only 7 knots when she struck, and as soon as this happened an explosion took place which filled the fore stokehold with steam, the pressure being 160 lbs. to the square inch. The three men who lost their lives must have been killed instantaneously. The alterations and repairs to the *Thrasher* will occupy nearly three months.

Portsmouth Dockyard.

The principal event of interest in this yard during the month has of course been the launch of the *Canopus*. A new *Majestic* will be immediately laid down on the slip she is vacating, during the coming financial year, and the new cruiser of the *Pelorus* type, the drawings of which have been in the hands of the authorities here for some time, is to be built in dock. The *Powerful* went through all her trials satisfactorily and has now left for China. The battleship *Trafalgar* has been paid off and has been selected to take the place of the *Inflexible* as guardship here. The *Crescent*, late flagship on the North American station, has also paid off, and estimates are now being prepared for her refit preparatory to another three years' cruise. There recently left here a staff of riggers for Southampton to lay down moorings for four vessels which are to be kept there in readiness to defend the harbour against a torpedo-boat attack in war time. The two sloops *Espiegle* and *Mutine*, the gunboat *Fanny* and the iron storeship *Industry* have taken on this duty. The question of supplying this yard with electric light has for some time been under consideration at the Admiralty. It is quite time that a proper system of lighting was introduced here, for owing to the present bad lighting some sort of accident happens every season. To light all the dockyards it is estimated that the cost will be nearly £100,000. The *Northampton*, training ship, after refit, has left on recruiting duties. The *Royal Arthur* and *Porpoise* will be commissioned on the 4th and 30th of this month respectively for service on the Australian station. The Royal yacht *Victoria and Albert* is now in dock here undergoing a partial overhauling, and will be in hand for about a month. The *Cæsar* has completed her trials without assistance from the dockyard officials, in spite of the engineering dispute, and the result was most satisfactory to all concerned. The visit of inspection paid us by the Lords of the Admiralty concluded by their lordships attending the annual ball in aid of the funds of the Seamen's and Marines Orphan Home. They expressed their satisfaction at the smart turnout of seamen and marines, and paid visits of inspection to the *Hannibal*, *Canopus*, and *Gladiator*. They visited

the site of the new barracks, and of the new electric lighting station. They went on board the *Vernon*, torpedo school ship, the *St. Vincent* training ship, and before attending the ball of the Seaman and Marines Orphan Homes, were entertained at dinner by Admiral Superintendent Rice, and the principal officers of the yard.

The Russian Navy.

The Russian Naval Estimates for 1898 have been made public, and from them it appears that close upon ninety million roubles are to be spent upon the Russian Navy during the financial year. Six million roubles of this money is to be spent on new warships, and more than fifteen millions on the extension of the harbour at Vladivostock. In the ordinary estimates 27,304,693 roubles are so be spent in shipbuilding and ordnance, 11,244,371 roubles on the maintenance of ships afloat, 4,014,513 roubles on the construction of barracks, etc., 4,487,556 roubles on the maintenance of arsenals and workshops, 7,421,595 roubles for shore staff, 3,705,420 roubles on the construction of Alexander III. dockyard, and 3,000,000 roubles for the extension and improvement of Vladivostock dockyard. The 3,705,420 roubles which has been granted for the Alexander III. dockyard at Libau is much larger than any previous grant. As soon as this dockyard is ready a greater part of the fleet will be transferred there in preference to Cronstadt, the present naval base, which does not meet with the modern requirements of the Russian Navy. The Government are very anxious to have Libau completed as soon as possible, and therefore have voted this large sum of money in order to hurry it forward. Ekaterinsk, on the north-west of the Murmanian coast, or Russian Lapland, has been chosen as the site for Russia's long cherished idea of a naval port near the Atlantic. The construction of this place is now being proceeded with as rapidly as possible, a harbour is being built, and Government buildings are springing up, and in addition to being a fishing and whaling centre will also act as a great Naval station. One of the chief reasons for choosing this place is because it never freezes.

The Increase in the Navy and Naval Engineer Officers.

The increase which has taken place in the Navy of late years has led a correspondent, evidently well informed on his subject, to write to the *Standard*, pointing out the expedients which have been resorted to in this connection in the case of engineer officers, and his letter has been considerably talked about in naval engineering circles. He says the result of the Admiralty's action in 1891 in retaining all the then retiring officers for five years longer, is that, instead of the older men continuing to retire on pension as hitherto, these men stayed on, causing a block in the general flow of promotion throughout the list. Yet, with all this, there are not sufficient chief engineers for the increased requirements of the Navy, and that instead of promoting those of the junior officers who are eligible and waiting for promotion, the Admiralty expedient is, that engineers (*i.e.*, officers next in rank below the chiefs) have been appointed "in lieu of chief," these officers carrying out the duties of a higher rank for the pay of a lower, this of course being a saving to the Government, which gets the duties of a higher rank performed at the cost only of the pay of the lower. Inducement, says he, for young men to enter the Navy is, that although the pay is small they can look forward to their retiring pension, which would become due at 50 years of age. If the block in promotion caused by the suspension of optional retirement is not removed or met by an adequate increase in the total number of promotions of those engineers who are eligible the effect on the junior rank becomes a hardship, as their promotion is delayed, and in the case of the junior assistants this delay is so pronounced that many will reach the age for retiring as engineers, 45 years, without the possibility of reaching the senior ranks, and only receive a maximum of £150 per annum as pension; whereas if the block had not occurred, they would have been duly promoted, and at 50 years of age entitled to retire on a pension of £400 per annum as a maximum. Upon our naval engineers depend much of the efficiency of the Navy, and the case for them is put by the correspondent of the *Standard* in a clear and straightforward manner, and ought to do something towards bringing about a proper recognition of their services. It is said to be the intention of the Admiralty to reduce the retiring age to 53. Warships are built nowadays faster than engineer officers are promoted, and the difficulty will not be got over by any such spasmodic efforts, and before promotion once more takes an even course much more will have to be done by the Admiralty.

Dry Docks for the American Navy.

The outcry which was raised in the United States when it was discovered that in order to have one of their battleships docked it was necessary to have recourse to one of our docks at Halifax, has apparently resulted in a big scheme of new dry docks being made public by Acting-Secretary Roosevelt. The reports of the engineers called in to examine the United States naval dry docks discloses an extremely serious state of affairs. Docks which have been constructed within the last four years are reported to be badly decayed and liable to give way at any time, and the engineers who have investigated the business report that not one of them is in a sound condition, and that nearly all show signs of great weakness, and are warped and leaking. The Dock Board, which met to consider the needs of the United States Navy in the matter of new dry docks, asserts that five new docks are urgently necessary, and their cost is reckoned at £1,155,000. Four of the docks, the board says in its "urgent" list, should be of concrete, namely, at Boston, New York, Norfolk, and Mare Island, this last to be 500 ft. long. At Algiers, New Orleans, Galveston, or Pensacola, mentioned as alternatives, it is proposed to place a steel floating dock and wharf, at a cost of £150,000. In addition to these the board recommends docks to cost £1,060,000 at New London, Newport News, Tortugas, San Francisco (concrete dock on Yerba Buena island, 700 ft. long, to cost £300,000), San Pedro (concrete dock 700 ft. long, at a cost of £300,000). The proposed additions are very extensive, but the board points out that with all the additions it proposes to the number of dry docks, they would, even then, have for naval purposes on their entire coast line only one more dry dock than Great Britain has at Portsmouth. At present the United States has a total of eleven dry docks, the only one which can take in battleships being that at Puget Sound, Washington.

Training of Non-Combatant Naval Officers.

A statement went the rounds of the daily and weekly press recently, to the effect that a large number of young engineer officers have recently entered the Navy without having the remotest idea of the use of either rifle, sword, or revolver. This fact was brought to the notice of the Admiralty, who have directed that in future all students undergoing instruction at the Keyham College will, in addition to the ordinary course of instruction, be taught musketry, sword exercise, etc., either in the fourth or fifth year of their college training. A feature of the first year's training is to be squad drill. It is somewhat surprising that this has not been thought of before and acted upon, when it is taken into consideration that even the stokers are taught musketry and cutlass drill. An extremely interesting article on this subject appeared in the last number of the *Windsor Magazine*, and in it some interesting particulars are given. The five years' training which the students undergo is dealt with and mention made of the sort of work he has to perform. The question of promotion is also gone into, Sir W. H. White being pointed out as an example of the bright prospects in store for those students selected by the Admiralty to train for the Royal Corps of Naval Constructors. Of the student at Keyham the author says he is always learning, from the day he enters the college fresh from school until 19 or 20 years later, when he blossoms forth, if all goes well with him, as a Chief Engineer, ranking with, but after, naval lieutenants of eight years' service, and with full pay at the rate of £255 a year, in addition to 2s. 6d. to 5s. a day if he has the good fortune to be serving on a ship flying an Admiral's flag. Such an officer, says he, has every hope of reaching the head of the service, with pay at the rate of £730 a year, and a retiring allowance, when sixty years old, of £500 a year. It must be admitted this is taking a somewhat roseate view of the question of pay and promotion.

Devonport Dockyard.

There is an abundance of work at this yard both in connection with building and refitting. The destroyer flotilla has undergone considerable alterations, consequent upon misfortunes which have happened to several of the boats, including the *Sparrowhawk*, *Thrasher*, *Skate*, *Rocket*, and *Shark*. It is reckoned that the *Thrasher* will cost at least £3,000 to repair the damage she has sustained recently. She will be replaced by the *Skate*. Many vessels are to be commissioned this month for duty on foreign stations. The *Sirius* is to be commissioned on the 9th, and is to take out new crews for the *Fearless*. On the 18th the *Doris* will be commissioned to relieve the *St. George* as

flagship at the Cape. The *Ringdove* is to be commissioned on the 9th, to replace the *Lizard* on the Australian station. On the 18th also the *Magicienne* will commission to relieve the *Philomel* at the Cape. Overtime has been resorted to in every department of the Keyham factory in order to get these vessels ready. The *Flora* has been paid off here, and superseded in her duties of transport cruiser by the *Edgar*, whose first voyage will be to the China station with new crews for the *Archer*, *Linnet*, and *Peacock*. A new cruiser of the *Pelorus* type is soon to be laid down here, and preparations for laying down her keel will be started immediately. She will be named the *Psyche*. Another interesting piece of information in connection with this yard is that notice has been served on behalf of the Admiralty upon the owners of the land adjoining the Royal Naval Barracks, to treat for its immediate sale. The necessity for a better system of lighting at this yard was illustrated in the preparations for the docking of the *Thrasher* and *Lynx*, as owing to the want of sufficient light the work was slow and dangerous as well, the men working in semi-darkness.

Chatham Dockyard.

There is a considerable amount of work going on at this yard, and plenty of overtime in addition. A large staff of men are working night and day on the *Rodney*, which is to be ready to hoist the pennant on the 25th of this month. The work on her will necessitate the expenditure of nearly £12,000. The *Galatea* is also likely to be in hand for some time in order to have the damage caused by the recent gun explosion set right. Repairs alone will cost something like £7,000, and the 22-ton gun itself has been rendered useless, and a new one will have to take its place. The machinery of the *Alarm* will be attended to as quickly as possible, in order that she may take up her coast-guard duties at Hull. The vessels which showed any defects during the Naval Manœuvres are now almost all seen to—the *Thetis*, *Swordfish*, *Audacious*, and *Porcupine* are completed, and have been passed into the fleet reserve. The *Severn*, *Venus*, and *Thetis* will now be seen to. The progress of the *Goliath* has been interrupted by the engineering dispute, as has the *Vindictive*, whose launch will now have to be postponed. In the ordinary course of events she would have undergone her steam trials in March next, but she is still waiting for her boilers. Her engines were made at this yard. She will probably be launched on December 9th, and if everything had gone smoothly with the *Goliath*, she would have been launched about the same time as the *Canopus*. The *Pioneer*, third-class cruiser, will be laid down early in December, and work on her will be pushed forward as rapidly as possible. The steam and gunnery trials of the *Illustrious* will have to be postponed, on account of the delay of the contractors, until the 25th inst.

Sheerness Dockyard.

There is plenty of work for everybody at this yard to last for some time to come, although the effect of the engineering dispute has been felt to a certain extent. The refit of the *Racoon* will claim attention now as the authority of the Admiralty has been sent to proceed with her refit. Her defects are not of a very extensive character. The Admiralty have not yet decided whether the *Acorn*, sloop, shall undergo another refit preparatory for the pennant, but it is supposed if she comes forward again it will be as a surveying vessel. The defects of the *Haughty* and *Janus* are being proceeded with, as well as the *Onyx*, which is now almost completed. The *Pomone*, if all goes well, is to be launched on the 27th of this month. She has a great many men working upon her. The visit of the Lords of the Admiralty was a somewhat uneventful one, and the only question in which they appeared to be interested was that affecting the future of the Gunnery School. It is expected that it will be transferred to the Naval Barracks when they are ready. The *Gleaner* is now ready to hoist the pennant when she is required, and she will probably take up the duties of tender to the coastguard ship at Queensferry. The *Onyx* is to undergo her annual refit at once instead of waiting until later in the year. The *Mohawk* has left for the Australian station where she is to relieve the cruiser *Rapid*. The *Hearty*, of the Fisheries Protection Squadron, has left for the North Sea, there to resume her duties.

Pembroke Dockyard.

There are not many ships here in hand, but work is not at all slack. Progress on the *Spartiate* proceeds apace, and her stern post has now been fixed in position. It was not considered as satisfactory as it should be, but was accepted in order that the progress of the ship should not be kept back. A casting of the same piece had been previously condemned on account of its being found unable to stand the official test. The building of the *Andromeda* does not seem to get on very rapidly, but now that the *Hannibal* is out of hand more men will be turned over to her. The accident to the *Thunderer*, in which it was discovered that the fore upper coal bunker had become flooded by some means or other, will not necessitate the docking of the vessel. The new Royal yacht is to be laid down very shortly on No. 5 slip, sometime during the present month. The first consignment of materials for her construction has arrived and the depot stores are being prepared for the reception of the gear which will be used on her. The Dowlais Steel Co., of Cardiff, will forge the steel plates for her.

Warships for Japan.

Japan appears to be bent upon becoming the primary Naval Power of the East, and it is calculated that, building as she is at the present rate, in ten years time she will be able to dominate both Russia and the United States in the Pacific Ocean. The total list of the ships now being built for her is reckoned to be four battleships, eleven cruisers, twelve torpedo-boat destroyers, and a similar number of torpedo-boats. Of these five immense warships are under contract at the works of Messrs. Armstrong, Whitworth & Co., and four torpedo-boat destroyers, 30-knot boats of the most formidable and modern type, are building at the Yarrow Works, and four more at Messrs. Thornycroft's. Of the five vessels building at the Armstrong Works three of them are battleships, one of 14,800 tons, and two of 12,200 tons, a first-class armoured cruiser of 9,600 tons, and a fast protected cruiser of 4,300 tons. The Thames Ironworks Co. have also a battleship in hand for the Japanese Navy, and Messrs. Thomson, of Clydebank, are building one, both vessels of 14,800 tons. On the Continent Japan has building a torpedo-boat destroyer and eight torpedo-boats at the Schichau Works in Germany, and four other torpedo-boats at the Normand Works in France. A cruiser of 9,600 tons is building at the Vulcan Works, Stettin, another at the Forge et Chantier works in France, and two in the United States. Contracts for several other vessels are to be given out shortly. Thus it can be seen that Japan is rapidly becoming a formidable sea Power. When these vessels have all hoisted the pennant Japan will have a Navy strong enough to hold its own against more than one of the European Powers.

Armour Plates and French-made Shells.

Some few years ago it became known in this country that a great many of the shells used by our Army and Navy were manufactured in France, and it was at once argued that the quality of the shells could not have been of the best, as the French would certainly, as good patriots and theoretically natural enemies, sell us inferior goods to those sold to their own Government for the French Army and Navy. Depending, as we then did to a certain extent, upon the French for explosives, it was pointed out that in the event of a war with that country we should find ourselves in a hole, and it was admitted by all concerned that such an arrangement could not be tolerated. The Admiralty, therefore, did their best to induce private firms to increase their facilities for manufacturing shells, and Messrs. Cammell & Co. seem to have fallen in with their views. Thus the same firm is now manufacturing shells in large quantities in addition to their usual work of armour-plate making, shells with which to penetrate, if possible, the armour-plates, and armour-plates strong enough to resist the shells, in this manner bringing the battle between guns and armour within a very narrow compass. There is little doubt that the 6-in. armour-plate which was successfully tested by Messrs. Cammell a week or so since will take the place of the 9-in. belt-armour in the new *Majestics*. One thing deserving of mention in connection with armour-plate trials is that the plate is never tested by an oblique shot, but it is hoped that when the new trial grounds at Whale Island are ready that the conditions will more nearly approach those which would happen in actual warfare.

Launch of the "Canopus."

On the 13th ult. was launched from Portsmouth Dockyard Her Majesty's battleship *Canopus*, the first of an entirely new class. Mrs. Rice, the wife of the Admiral Superintendent, performed the christening ceremony, and the vessel took the water without the least delay or mishap occurring to her. Her

class, it is believed, will be limited to the six vessels now in hand, two of them at Government yards and three others under construction in the private yards. During the time she has been under construction, some nine months, about 4,500 tons have been worked into her, and it was calculated that the launch was one of the heaviest on record. The "setting up" of the ship had been in progress since 4 a.m. on the morning of the launch, and when the blocks under the keel of the vessel were at last hammered away the bugles sounded the warning "Stand clear," and then Mrs. Rice, advancing to the rail of the dais which had been erected, smashed the customary bottle of wine against the bows, and christened the vessel, adding, "Success to the ship and all who shall sail in her." The band struck up "Rule Britannia," and the huge battleship gracefully glided down the greased ways into the water, to be immediately taken in tow by the Government tugs. A description of the vessel and her machinery has been given here in previous numbers. At present she carries no armour-belt, and it is not expected that any of the protective plates will be forthcoming until the engineering dispute is terminated. Some of her bulkhead plates have been received, but these will not be placed in position until she is in dock. Her complement will consist of 750 officers and men. On the slip she has vacated will be immediately commenced a new battleship, also the first of a new class.

MECHANICAL TRANSMISSION OF POWER ALONG SLACK WIRES.

THE use of a flexible medium for the purpose of transmission of power as rotary motion by setting up a torsional strain in a flexible medium is well known no doubt to most of our readers, as, for example, the so-called flexible shafting for operating portable drilling and tapping machines used in engineering shops or in the construction of metallic structures, also as used in dental surgery for operating revolving tools from a foot-driven mechanism, but the idea of applying approximately similar means for the transmission of energy by reciprocatory motion is something of a novelty. Mr. Ernest M. Bowden, of 9, Fopstone Road, Earl's Court, London, S.W., has, however, attacked this latter problem, and has solved it by inventing a simple mechanism involving, as

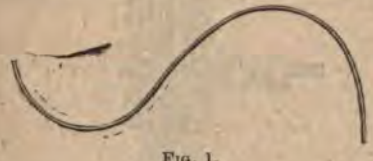


Fig. 1.

far as we know, a novel set of conditions, by which small amounts of power can be transmitted round corners or between points which are not fixed, without the use of any such complications as pulleys, angle levers, or ball joints, in fact in all cases where a direct lead is not obtainable.

The principle will be readily understood with a small mental effort by means of the diagrams which we give herewith.

If you take a single slack wire as shown in Fig. 1, and pull one end of it, little or no power will be exerted at the other end, until the wire has been drawn tight. But if two wires are taken, one of them preferably longer than the other, and they are tied together at intervals, as shown in Fig. 2, so that they cannot part company, but can slide one along the other, and if the short one is held and the long one is pulled, the relative movement will be transmitted from end to end, and a positive mechanical connection obtained through a loose and flexible medium. Obviously, one of the wires must be inextensible, and the other incompressible. In practical applications for convenience and appearance they are not tied together, but one is wound into a spiral form with the coils touching one another so that it makes a small tube, exceedingly flexible but incompressible, and the inextensible wire, which is stranded, thus rendering it equally flexible and reliable, is carried inside the coiled wire as shown in Fig. 3.

Fig. 2.

At each end the inside wire projects beyond the outside, and is passed through a hole which is not large enough for the outside or tubular wire to go through; this hole, however, being preferably, but not necessarily, large enough part of the way to form a sleeve which holds the end of the outside wire, and then reduced in size to form a sleeve or guide to take only the inside wire. If the inside wire is pulled and one end of it is drawn, say, an inch out of the tubular wire, the other end will be drawn the same distance in, and in being so drawn in, it performs the work which has to be done, although the wire cord formed of the two wires may hang loosely about in any position, but must of course have no sharp kinks of any sort in its length.

Fig. 4 shows a simple example of this, in which the wire cord is shown as the only connection between two independent plates. Each plate has a small projection on it, through which the outside wire cannot go; but the inside wire is passed through the projections and attached at one end to a lever, and at the other to a spiral spring. Notwithstanding that the model is suspended in mid-air, and that the cord is coiled into a knot, the action is positive. When the lever is moved to the dotted position the spring is extended and when the lever is released the spring draws it back.

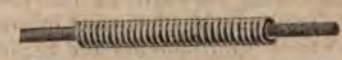


Fig. 3.

It appears to us that this device is only applicable for purposes where the amount of power expended at one end is considerably greater than is required at the other, and that such loss is negligible, as the mechanical efficiency of the device must decrease for every increase of the number of bends in the wire. It may be remarked that the compression member has

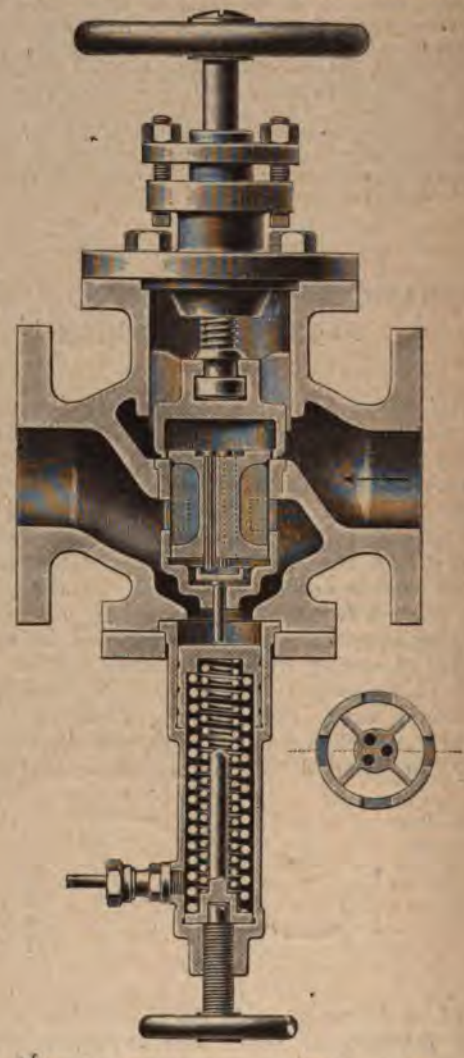
to bear the same amount of compression as the other member tension, and must therefore be made strong enough to resist crushing. By using suitable steel wires, which can be plated to prevent rust, considerable strains can be borne with absolute reliability. As described above the invention gives an effective move-

Fig. 4.

ment in one direction only, viz.: by tension on the internal wire, but by making both members incompressible and inextensible, it is possible to obtain an effective movement in both directions, by setting up alternate tensional and compressive strains on the inner wire.

IMPROVED MULTIPLEX REDUCING VALVE.

THERE are few steam fittings upon which so much ingenuity has been spent by inventors as upon steam reducing valves, and yet it is an acknowledged fact that at the present moment there is not in existence a reducing valve which is thoroughly reliable under all circumstances. One of the chief difficulties consists in constructing an equilibrium valve which shall close perfectly steam-tight when the pre-determined pressure has been reached on the reduced side. This difficulty has at length been solved by Messrs. Schaffer & Budenberg, Whitworth Street, Manchester, in their new "Multiplex" reducing valve, illustrated herewith, and this invention, which may be regarded as a distinct step forward in the development of reducing valves, will be of special interest in connection with many requirements on board ship, where the utilisation of high-pressure steam, as reduced pressure for minor engine plants, is so frequently essential, and is of considerable importance. Up to the present the advantages of reduced pressure valves for this purpose have perhaps not been so fully recognised as they deserve, but the example set by the Admiralty in using reduced steam for the Belleville boilers will, no doubt, assist in drawing attention to the importance of this system, as not only possessing the advantage of giving a much drier steam, but also affording facilities for the storage of steam by putting in boilers of higher pressure capacity than are absolutely required. The novel feature to notice in this improved multiplex reducing valve, it may be explained, is the use of a simple back pressure valve instead of an equilibrium valve. This valve can be made and maintained perfectly steam-tight without any difficulty, as the full force of the high-pressure steam rests upon the valve in the closed position. High-pressure steam enters the valve in the direction of the arrow shown in illustration, and the pressure



on the reduced side acts upon the piston, and is balanced by a spiral spring, the space beneath the piston being in communication with the atmosphere. The valve being closed, as shown in illustration, a reduction of pressure on the reduced side will cause the spring to gradually force up the piston along with a circular disc attached to the piston, causing it to successively open a number of small back-pressure valves arranged in the central portion of the main valve. The large valve is thus relieved of pressure, and is opened in turn by the piston disc. The successive opening of the small back pressure valves is

effected by making them with guide stems of different lengths. The force exerted by the piston, in consequence of a small reduction of pressure on the reduced side is sufficient to open one of the small back pressure valves at a time, but each valve after it has been opened offers practically no further resistance to the progress of the piston, so that all the small valves are easily opened. As soon as this is done the large back-pressure valve is entirely relieved of pressure, and a small force exerted by the piston will suffice to open this valve also. The reduction of pressure can be regulated by means of the spring, the tension of which is varied by adjusting the small hand wheel at the bottom of the valve. A separate stop valve, whereby the pressure can be shut off altogether, is provided.

INSTITUTE OF MARINE ENGINEERS.

THE BRISTOL CHANNEL CENTRE.

Annual Dinner at Cardiff.

THE seventh annual dinner of the Bristol Channel Centre of the Institute of Marine Engineers took place at the Royal Hotel, Cardiff, on Saturday night, October 16th. Professor A. C. Elliott, D.Sc., the President of the Centre, occupied the chair, being supported by Rev. Canon Thompson, D.D., vicar of Cardiff; Mr. Arch. Hood, J.P., chairman of the Vale of Glamorgan Railway Co.; Mr. John Gunn, J.P., Mr. John Duncan, J.P., Professor Clatterton Richards, M.A., Mr. Lascelles Carr, J.P., Professor H. Lloyd Tanner, M.A., Captain Johnson, R.N.R., Mr. Edmund Handcock, jun., Captain Rosser (dockmaster Cardiff), Mr. J. J. Leaning (G.W.R. divisional superintendent), Captain Davies (dockmaster, Barry), Mr. A. H. Rule, Professor Galloway, C.E., Mr. J. A. Jenkins (registrar University College), Mr. A. K. Hamilton (Lloyd's Registry), Mr. J. T. Duncan, Mr. W. R. Hawkins (secretary Cardiff Chamber of Commerce), and the following office bearers:—Vice-Presidents—Mr. David Gibson, Mr. T. W. Wailes, and Mr. J. F. Walliker; members of committee—Messrs. J. Chellew, W. Scott, T. A. Reed, H. G. Symonds, W. Simpson, and R. Williamson; hon. treasurer, Mr. A. E. Smithson; hon. secretary, Mr. Geo. Sloggett. The following contingent from Swansea was in attendance:—Messrs. Ivor G. Williams, W. Barclay (Lloyd's surveyor), J. Heslop, R. Andrew, John Harris, John Rose, D. Dill, J. Davies, W. Earp, and E. Turner.

Congratulatory telegrams were received from Mr. James Adamson, the hon. secretary of the Institute, and from the Southampton Centre. Mr. J. Fortescue Flannery, M.P., the President of the Institute, had accepted an invitation to be present, but to the universal regret of members a telegram was received from the hon. gentleman stating that owing to an attack of influenza he found himself unable to fulfil his engagement. A letter expressing regret at his inability to be present, on account of a prior engagement at Newcastle, had also been received by the hon. secretary from the Hon. Charles Parsons.

The President gave "The Queen," and "The Prince and Princess of Wales and the Royal Family."

Mr. Lascelles Carr proposed "The Ports of the Bristol Channel." In doing this he said he had only one consolation in being suddenly called upon to submit the toast, and that was that he was standing in the shoes of the member for Merthyr, Mr. D. A. Thomas. He regarded the hon. gentleman's absence as an outward and visible sign of his intense desire to prove that the allegations which had been made against him of philandering with the maid Cardiff" were not true. In his nursery days, when he was learning geography, the Bristol Channel ports were covered by the word "Bristol," but there had been since a swinging of the pendulum. He did not want to say anything in disparagement of Bristol, because he saw by the papers that, awaking at the last moment to their responsibility, the Bristolians were actually going to spend money on their docks. It could not, however, be denied that the trend of trade was to the Welsh side of the Channel—Cardiff, Penarth, Barry, Newport, and—should he say—Porthcawl, Port Talbot, and Swansea—(A voice: "Put Swansea first.") The gentleman who said "Put Swansea first" was looking to the future, as Swansea had been doing all its life. He felt that this toast was one which really ought to be in the hands of the responder, Mr. Archibald Hood, who in his response would instruct and possibly amuse them by telling them the secret genesis of the Barry docks. What could be more delightful than that? For those who knew of the millions that had been made there, and who were hankering after something of the same sort, Mr. Gunn could tell them enough to set them building docks all along the foreshore.

Mr. Archibald Hood, in responding, said Mr. Carr expected him to tell some secrets of the Barry dock. A celebrated Scotch poet had told them—"Aye keep something to yoursel' which ye dinna tell to ithers." He would only say that Barry Dock had been the means of cheapening the transit of coal to the port of shipment in the Bristol Channel, and had also given an impetus to dock building. And, what was very satisfactory to the promoters of the Barry Dock, the carrying out of their project had not yet ruined Cardiff. With regard to the occasion which had brought them together, he thought marine engineers should not remain content with the great development of steam in the present century. He could not see why there should not be as much progress in the next hundred years as in the past century. Many things could be done in the way of improving steam navigation. If a lighter and stronger metal could be discovered to make some parts of the engine, or the hull of the vessel, an immense improvement would have been achieved; while every successive step in the direction of economising fuel gave a fresh impetus even to the coal trade, because it increased the number of steamers. One thing that was wanted was to discover some method of producing aluminium cheaply. A chemist lately spoke to him of a method he alleged he had discovered of doing this; and he (Mr. Hood) replied that if he had succeeded to the extent that he represented he could make himself a millionaire ten times over. The inventor wanted him to assist him with money, but he had not sufficient faith, or hope, or (the discoverer probably thought) sufficient charity to do so. It was not, however beyond the power of the chemist to discover some method of producing aluminium, which, with certain alloys, might be made as strong as steel, or even stronger.

The Rev. Canon Thompson, D.D., proposed "The University of Wales." A University, he need hardly tell them, was a large literary, scientific, and academic corporation, and, though a corporation, it was due, like all great effects and institutions, to the initiative and enthusiasm and power of the individual. Now, he felt almost inclined to be silent to-night. He felt it very hard to speak, and they would believe him when he said so, because he could not forget, and not one of them would wish to forget, that the University of Wales was largely due to the zeal—the chastened zeal—the persistent efforts, the refinement and culture of a man than whom none greater or more beloved had ever lived and died within the neighbourhood of their town. He could not but think of the dear dead Dean, now lying in his beautiful home at Llandaff—one who, had he been alive, would have been with them in spirit, especially had he known that such a toast as this was to be entrusted to a humbler brother of his own. He was proud to know that among the most active promoters of the University Colleges of Wales, and, therefore, among the principal and most potent factors in the life of the Welsh University, was a clergyman. It had been sometimes supposed—perhaps it retained its place as a fictional legend in the minds of many even to-day—that the parson knew little else besides the Church Catechism, the Thirty-nine Articles, or, perhaps, the pages of the Greek Testament. Now, the life and record of Dean Vaughan had shattered to the four winds any such idea as that. He was the principal factor in the creation of the University of Wales. They all knew that he was the principal factor in bringing the University College to Cardiff—nay, in the promotion of the ideas which brought university colleges within the borders of the Principality—and he (the Canon) would like to ask whether it was in the least degree probable there would have been a University of Wales if the University College had not been located at Cardiff. His own idea of a University was this: that not only should it be a degree-conferring body, conferring degrees after formal examination upon the members of its colleges, but that it should gather into itself, not only lads and young men, but

men of any age who, by the persistency of their self-effort, by their own native enthusiasm, by the use of such gifts as God had given them, had thrown light upon branches of learning and art, or who had proved fertile in invention, or who were literary and scientific ornaments in the community in which they lived. He was now thinking of such a man as John Storrie, who, by self-culture and indomitable perseverance and research, had shown that in some departments of learning he was almost a past master. It would be a grand idea if the University would recognise such work, and such gifts, such perseverance as Mr. Storrie's, and add him and men like him to the University roll, as well as those who by more formal processes passed examinations, and took their degree. Some people might ask, "Where is this University of Wales?" Well, he had at any rate seen it once, and he should never forget the splendid spectacle which it presented when the Prince of Wales was installed as its Chancellor at Aberystwith. It was worth going many miles to see the first gentleman of Europe, with that courtesy which was inalienably his own, grasp the hand of him who, if not the greatest of living Englishmen, was at once the most versatile and most cultured of all his fellow-countrymen. When the Prince of Wales grasped the hand of Mr. Gladstone, and conferred upon him affectionately, reverently, respectfully, and worthily, the degree of a Doctor of that University, it was a sight to make an old man young. They wanted the University of Wales to be not only a splendid abstract idea, but a concrete thing. They wanted to know where its offices were; and, of course, if they were to be anywhere they ought to be located in Cardiff.

Professor Lloyd Tanner spoke in acknowledgment of the toast.

At the invitation of the President,

Mr. John Gunn submitted the following resolution of condolence:—"The Bristol Channel Centre of the Institute of Marine Engineers desires at its annual meeting to convey to Mrs. Vaughan its deep and sincere regret at the irreparable loss sustained by the whole community in the death of her illustrious husband, and its respectful sympathy with herself in this hour of trial and bereavement." It was, he said, a question of serious consideration with him, having regard to the death of Dean Vaughan, whether he ought to be present on this occasion, having the privilege of being a neighbour and a personal friend of the lamented Dean; but the Christian catholicity of the Dean of Llandaff knew no bounds, and he felt it would be no disrepect to his memory to carry out his promise.

The vote of condolence was passed in silence, the whole company rising to its feet. Then the Goodwillie Singers—Messrs. Perman, Stoker, Balcombe, and Dobbs—sang "Crossing the Bar," music by Dr. J. F. Bridge, a deep effect being produced upon the sympathetic auditors.

Mr. John Gunn then gave the "Institute of Marine Engineers." He congratulated the Institute upon its excellent record of work done, and the Centre upon having as its President so able and so highly esteemed a gentleman as Dr. Elliott, the professor in engineering at the University College of South Wales and Monmouthshire. The speaker made allusion to the great engineers' dispute, and expressed his regret at the absence of reasonable means by which capable workmen and honest employers might meet upon common ground and come to an honourable understanding, so that such grave industrial crises might be avoided, and thus make secure for all time Britain's commercial and maritime supremacy.

The President, in responding to the toast, was cordially received. He said although the Bristol Channel Centre was, and ever would be, an integral part of the great institution to which the bulk of those present belonged, yet it had a life and an initiative peculiarly its own. He felt gratified that the toast had fallen to a man like Mr. John Gunn, who, as a shipowner—as the head of a large engineering firm, as a member of Lloyd's Committee, as a political champion, as a pioneer worker in, and an upholder of, the cause of liberal education, was known far and wide. Upon more than one occasion he (Dr. Elliott) had spoken of the centre system—the system upon which is constituted and worked the centres at Cardiff, Southampton, and Bombay. It was a great function of scientific, engineering, and technical societies to print "Proceedings," and it might be thought that it mattered not a jot where the average member lived, provided his abode was within the reach of the postal service. But he held that that was not the highest function of such a society. It was the discussion, and the consequent personal contact, which was the life and soul, the essence, of an intellectual society such as theirs. Ordinarily, a member of the Institute of Marine Engineers would only participate in the intellectual life of the society in the most limited sense by perfunctory attendances in London, where, through lack of that quality to which he had referred—personal interest—he would be unknowing and unknown. The centre system, then, brought them into contact with themselves. It afforded an opportunity for a man to make himself known in his centre, and when he went beyond his centre, say, to London, to visit the parent Institution, he was known not only as a unit member of the Institute, but possibly as a leading light in his own centre. With regard to the work of the Bristol Channel Centre, he thought they were entitled to congratulate themselves upon their progress. Excellent work was done last session. The papers of Mr. S. F. Walker and Mr. M. W. Aisbitt were worthy of Cardiff, and were, he knew, warmly received in London. In addition, they had made some interesting and very instructive excursions. With regard to the Institute at large, it was growing from more to more. Founded in 1889 by the planting down of a single sovereign at a small meeting, its membership now approached to nearly 2,000. Great as that membership was, it was not trenching in a measurable degree upon the field in which they had to operate. That field was only touched. Remarks had been made from time to time as to the value of what was called an engineering qualification, as to the value of being a member of one of our great technical institutions or engineering societies. It had been asked what guarantee was this membership of the professional ability of the man, and he was afraid there was but one answer as things stood in this country—there was none. They fell back upon the man's record, upon their knowledge of him individually; but the mere fact that he was a member of such a society conveyed with it no guarantee. On the other hand, the Institute of Marine Engineers opened its portals in a large degree only to those who could produce the necessary certificates of having passed an examination—he referred to the examinations of the Board of Trade. He should say that from 80 to 90 per cent. of their members had subjected themselves to these examinations and come triumphantly through them. It was true that possibly they were not of the standard of some examinations; nevertheless there was a definite standard, and it was, he was bound to say, a respectable standard; and on such basis the Institute of Marine Engineers was entitled to claim a certain respect. The Institute had done good work in the reading and discussion of papers, in making suggestions relative to the alteration and amendment of the Board of Trade regulations affecting the admission of engineers to the Mercantile Marine and the conditions under which they worked. This was good work, and he thought they were entitled to claim some credit for it. With regard to progress in marine engineering, this was a long story, but he might say for the benefit of their guests that it had come to this pass: that on the long distance the railway engineer had been beaten. There were two long courses. There was the long sea course, such as the passage across the Atlantic; and there was another course, from New York to San Francisco. It was possible to do the three thousand miles from Liverpool to New York in a shorter time than to do the same distance from New York to San Francisco by rail. With respect to the short course, the marine engineer was pulling up, hand over hand, on the railway engineer. Thirty knots had been passed; 33 knots was in the air, and likely soon to be realized; and there was talk of 35 and 37 knots an hour. There was also talk of a revolution in marine engineering, of a return to the dream of every engineer's boyhood—of a return to the rotary engine of a steam turbine. He was glad to be able to announce, with a small reservation, that the Hon. Charles Parsons would probably open their sessions in Cardiff with a paper on his steam turbine, and on the experimental results he had obtained from the launch which he had fitted up with it. They were not even left to themselves in the realms of literature. In science they claimed to know something. Of art they knew a little. No less a poet than Longfellow had painted the dignity of the naval architect. Bulwer Lytton and others had glorified the electrical engineer and the mathematical physicist; and the marine engineer had secured an appreciative poet in Rudyard Kipling. It occurred to him as the proceedings were in progress that it might not be a bad shot to interpret Mr. Rudyard Kipling's extreme love for the marine engineer as a hankering after the honour and dignity of honorary membership of the Institute of Marine Engineers.

Mr. John Duncan, J.P., proposed "The Mercantile Marine," observing that a Briton never felt more proud of his nationality

than when he was continually beholding the red ensign in his travels through the world. The enormous development of the Mercantile Marine, he said, was a striking proof of the commercial prescience, business capacity, and indomitable perseverance of the British people. The success of the nation was very largely bound up in the success of the Mercantile Marine, and the decadence of the Mercantile Marine would assuredly herald the decadence of the British Empire itself.

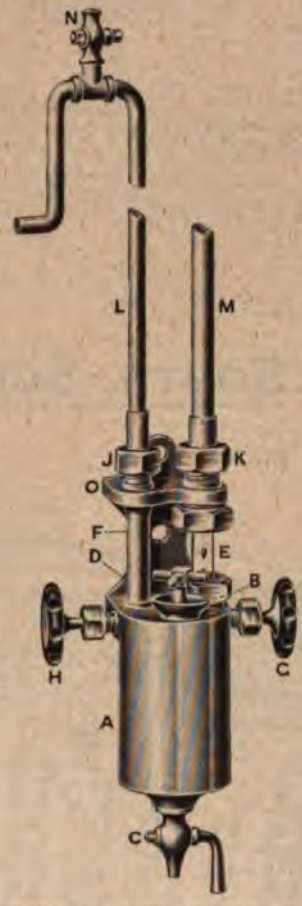
Mr. Edmund Handcock, jun., responded. He remarked that they had a very fine fleet of ships belonging to Cardiff, and he hoped soon to see Cardiff the port of all big liners.

Mr. J. T. Duncan proposed, in eulogistic terms, the health of the President, and Dr. Elliott, in response, paid a hearty tribute to the co-operation which he received from the hon. secretary (Mr. George Sloggett) and his committee.

The eminently successful proceedings closed with the singing of "Auld Lang Syne."

SIGHT-FEED LUBRICATOR.

WE illustrate in the adjoining diagram the new design of sight-feed lubricator which has been brought out by the Vacuum Oil Co., of 47, Victoria Street, Westminster, particularly for use with their heavy cylinder oils.



There is nothing new in principle about the lubricator, which is of the ordinary gravity type, intended to be fixed in any convenient position against a bulkhead or other vertical surface, and to feed to the desired point by means of the pipe M. For this purpose the pipe L is of course carried to a point considerably higher than the highest point of M, say four or five feet, the upper portion of L then forming a condenser. This general principle is of course well understood, and is common to all lubricators of this type. The special merits claimed in the design are simplicity and rigidity. The principal portions are cast in one piece, making it impossible for any part to get out of truth, and giving a construction so rigid that breakage of the sight feed glass E, is extremely unlikely. In many lubricators the glass is easily broken by a too vigorous use of the spanner upon the coupling nuts J, K, causing some part to spring; this is obviated by the device being made of one strong casting. Further, the lubricator is supported at the proper place, viz., immediately near the sight-feed glass, so that vibration at that point is reduced to a minimum. The ordinary method of supporting the lubricator at the foot raises vibration at the point E, where it is not wanted, to a maximum. Another feature is that a vertical rise is provided from the cup A straight into the oil-pipe M, and the latter is made of large diameter. This tends greatly to facilitate the rise of the oil drop with the heaviest oil.

The coupling K, contains a small ball valve, which closes automatically in case the sight-feed glass should accidentally get broken.

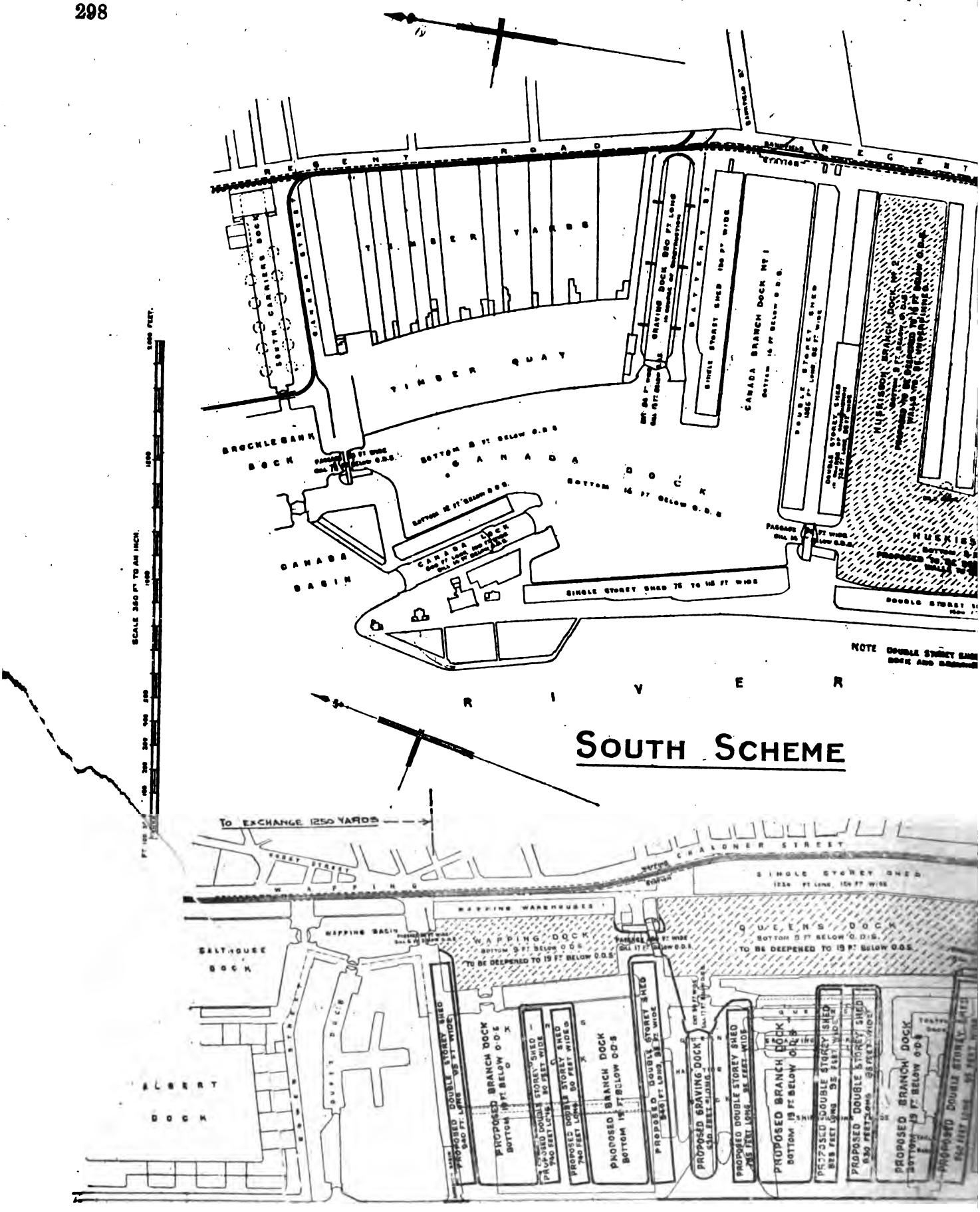
We understand that this lubricator will feed the heaviest oil, with absolute regularity, at any rate from one drop per minute to a continuous stream. It is claimed by the company that one pint of their special Vacuum cylinder oil per 24 hours is an average quantity necessary to internally lubricate a 200 N.H.P. triple-expansion engine, which means a very low rate of feed, such as could not be regularly effected unless a steady and regular formation and delivery of the oil drop were ensured as a practical certainty.

PATENT "NAVAL" METALLIC PACKING.

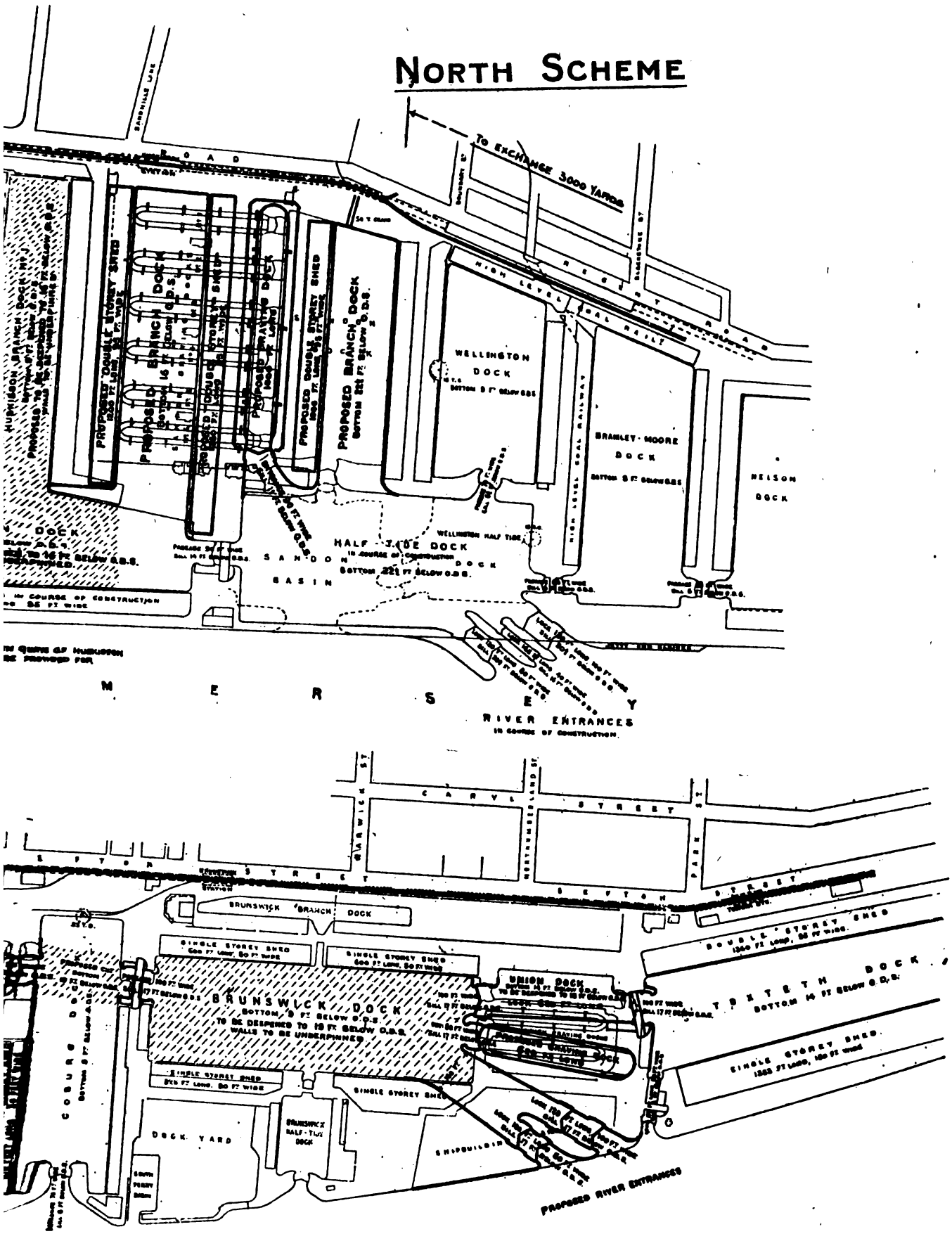
WE have pleasure in illustrating in the adjoining diagram the general arrangement and construction of the Patent "Naval" Metallic Packing, the London agents for which are Messrs. Geipel & Lange, 68, Victoria Street, Westminster.

The illustration shows the packing partly in section and partly in elevation, and it will be seen that the device consists of a gun-metal conical spiral spring C, of larger diameter in the middle than at any other point, decreasing in diameter from centre towards both ends, gradually and equally, and bored to fit the piston rod A. Two gun-metal conical-shaped cups B are arranged to fit over the ends of the spring C, and are of such diameter as to fit the ordinary stuffing box.

The space D, between the coils of the spring is filled with a loose fibrous packing or white anti-friction metal, or equivalently one end of the spring can be filled with one and the other end with the other material. A soft metal washer E is placed beneath the cup B at the back end, which is pressed into shape, and forms a perfect joint, while in the front end a single coil E of asbestos or other lubricant packing is arranged. The working of packing consists in a

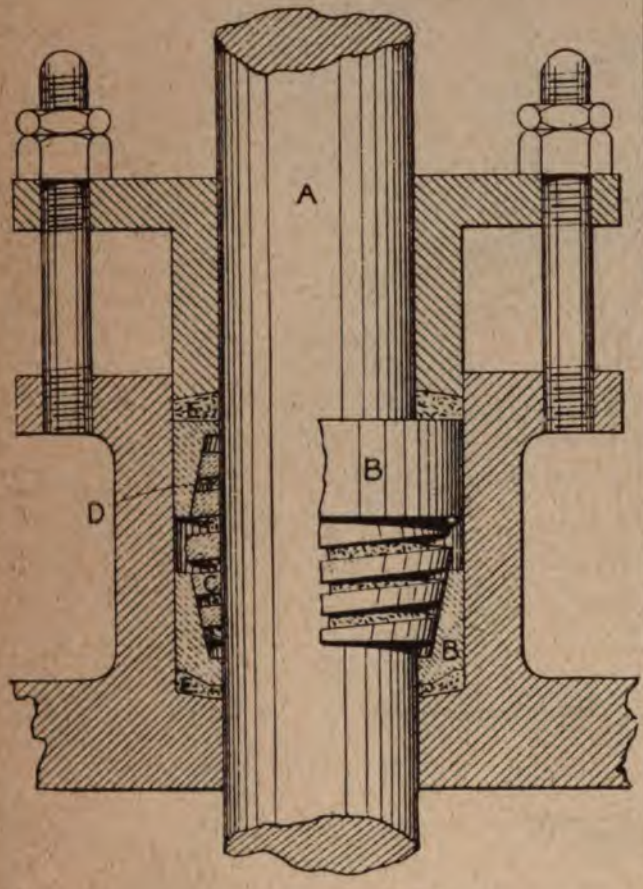


THE NEW SCHEME OF THE MERS


NORTH SCHEME
To Exchange 3000 Yards
ROAD
REGENT ROAD
HIGH LEVEL GOODS RAILWAY
PROPOSED DOUBLE STOREY SHED
PROPOSED BRANCH DOCK
WELLINGTON DOCK
BRAMLEY-MOORE DOCK
NELSON DOCK
HALF-TIDE DOCK
SANDON BASIN
MERSEY
RIVER ENTRANCES
CARVER STREET
BRUNSWICK BRANCH DOCK
BRUNSWICK DOCK
UNION DOCK
DOCK YARD
PROPOSED RIVER ENTRANCES

slight coiling or wrapping of the spiral spring round the piston-rod caused by pressure by the gland through the cups B.

It is claimed that it is not a rigid packing, as the formation of the cups, with space between allows a



movement varying with the rod, similar to floating by springs, but without the risk of breakages and consequent stoppage of machinery. It may be noted that, if preferred, grooves can be cut in, and piston-rings added to both cups, so as to make the packing perfectly floating. We understand that this packing has been working continuously for years on engines, without any appreciable sign of wear on either rod or packing being perceptible.

THE NEW SCHEME OF THE MERSEY DOCKS AND HARBOUR BOARD.

THIS scheme involves the expenditure of about £3,300,000 of money. It was laid before the Dock Board by one of its committees on the 14th October. On the 21st it was considered, approved and adopted, and a bill empowering the Board to carry it out—reserving, of course, power to vary the details—is to be promoted during the ensuing session of Parliament. Some large works are already in process of construction—notably those near the Sandon Basin. The details of the present programme are sufficiently discussed in the "Fleets of the Mail Lines," and we need not do more than refer our readers to that column.

Refrigerating and Ice-Making Machinery.—Messrs. Furness, Withy & Co. have decided to fit up two of their ships with cold storage for the Canadian trade, and have placed the order for the machinery with the Linde British Refrigeration Co., Limited, 35, Queen Victoria Street, London, E.C. This makes ten boats the Linde British Refrigeration Co. have fitted, or are fitting for this particular service. The Linde Co. have also orders in hand for installations for the Union Steamship Co., of New Zealand, the Osaka Co., of Japan, the Nippon Yusen Kaisha, and many other important companies, and are erecting large cold storage and ice making plants in Bristol, Leeds, Bradford, Liverpool, Grimsby, Bath, and London, besides others in South Africa, Canada, Australia, and New Zealand. Altogether nearly 3,300 plants have been supplied, of which over 450 are for use on board ship. The capacity of these machines is equal to the refrigerating effect produced by the melting of no less than 75,000 tons of ice every 24 hours.

Delta Metal.—The Central Laboratory of the French Ministry of Marine have, after a series of severe tests, authorized the use in the Naval yards of the Republic, of Delta Metal for the manufacture of various fittings of high pressure boilers, such as valves, cocks, gauges, &c. An official order to this effect was issued by the Bureau of Naval Construction of the Ministry on the 23rd of September last.

Messrs. Thomas Richardson & Sons, Limited, Hartlepool, who are working in conjunction with Messrs. Brown Boveri & Co., the well-known electrical power engineers, of Baden, have appointed Messrs. Geipel & Lange, of 68, Victoria Street, Westminster, as their London representatives. Messrs. Richardson's installation at Hartlepool is creating great interest in industrial circles, and we understand the firm has booked a large number of orders for Polyphase Electric Machinery.

Flensburger-Schiffsbau-Gesellschaft.—At the general meeting of this company on September 30th, the board of directors proposed to pay a dividend of 8 per cent. The yard had only been in work nine months, as there had been a three months' strike at the beginning of the year.

Scandinavian Shipowners and Labour Disputes.—One of the Tees builders has forwarded us a copy of a letter which they have received from Scandinavian shipowners, and which reads as follows:—"We thank you for your esteemed favour of the 12th inst., contents of which we note, and we should be happy if we could secure you the order in question. The specification and plan are now being printed, and will be sent you in a few days' time; but we very much fear that unless you can give delivery in April or May, our friends will not be able to pass you the order, and probably it will then go to German shipbuilders, who are more reliable in consequence of not being so completely in the hands of the workmen as the English shipbuilders are. It is indeed most annoying that so much trouble is always brewing in England by the union officials, and if the men only knew what trade they are sending away to foreign countries they would not act as they are doing. English workmanship is very much desired by Scandinavian owners, but people on this side are becoming disgusted with all the labour disputes in England, and the uncertainty and the troubles caused in consequence.—Yours very truly, ———." As they say, this means breaking connections. Possibly, when the Scandinavians get into the German yards, they may elect to stay there, and their preference for English workmanship probably will disappear.

Aspinall's Patent Marine Engine Governor.—We understand that since the notice on this Governor appeared in our June, '94 issue, no less than over 300 have been sold, including those fitted on 11 steamers belonging to the Lamport and Holt Line.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from August 25th to October 23rd, 1897 :—

Aborn, George, fleet engineer to the *Neptune*, to date October 19th.

Allen, A. J., fleet engineer, has been placed on the Retired List of his rank.

Allen, William T., fleet engineer to the *Eclipse*, to date October 19th.

Anderson, Arthur R., engineer to the *Spider*, undated.

Andrew, W. J., staff engineer, has been advanced to the rank of fleet engineer on the Retired List.

Attwool George, engineer to the *St. George*, to date October 6th.

Baldwin, Henry St. C., engineer to the *Cossack*, to date September 28th.

Banister, Charles, engineer to the *Niger*, to date September 22nd.

Bills, William H. T., fleet engineer to the *Inflexible*, to date September 28th.

Bills, William H. T., fleet engineer to the *Inflexible*, to date October 13th.

Brown, Percival R. T., engineer to the *Peacock*, on her re-commissioning.

Brown, Thomas F., assistant engineer to the *Trafalgar*, to date October 13th.

Carlisle, Archibald H., assistant engineer to the *Edgar*, to date October 21st.

Chase, John E., fleet engineer to the *Trafalgar*, to date October 13th.

Christian, Thomas W., engineer to the *Hunter*, to date October 5th.

Cook, William, fleet engineer to the *Crescent*, to date October 16th.

Drought, Arthur E., assistant engineer to the *Niger*, to date September 22nd.

Dupen, Arthur P. L., engineer to the *Vivid*, additional, to date October 7th.

Edgar, Edward J., acting chief engineer to the *Brisk*, to date October 13th.

Ellis, Matthew W., fleet engineer to the *Spartan*, undated.

Goodwin, Frank A., assistant engineer (temporary) to the *Victory*, to date September 24th.

Gorfett, G. J., chief engineer, has been advanced to the rank of staff engineer on the Retired List.

Grant, W. H., staff engineer to the *Edgar*, to date October 21st.

Gregg, Charles J., engineer to the *Archer*, to date October 21st.

Guyer, Thomas S., engineer to the *Jackdaw*, to date September 29th.

Ham, John W., engineer to the *Fame*, to date October 21st.

Hammond, Cyril E. J., assistant engineer to the *Vivid*, to date September 24th.

Harding, Charles A., assistant engineer to the *Powerful*, to date September 30th.

Harding, R., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hender, W. J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Hender, William J., chief engineer to the *Flassy*, to date September 1st.

Hines, W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hughes, Henry R. S., assistant engineer to the *Trafalgar*, to date October 13th.

Hughes, T. C. E., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Kirwin, Joseph J., assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Kitching, Henry W., assistant engineer to the *Active*, to date September 28th.

Laird, George F., fleet engineer to the *Royal Arthur*, to date September 28th.

Legate, James, assistant engineer to the *Onyx*, to date September 8th.

Little, Herbert J., engineer to the *Victory*, to date August 12th.

London, A. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Loveridge, Henry J., assistant engineer to the *Hussar*, to date September 3rd.

Mallinson, Ernest D., engineer to the *Vernon*, additional, to date October 22nd.

Manning, Henry L., engineer to the *Fame*, to date August 24th.

Manning, H. L., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Manning, Henry L., chief engineer to the *Fame*, to date October 1st.

Manning, Henry L., chief engineer to the *Archer*, to date October 21st.

Mayston, John Y., inspector of machinery to the *Tamar*, for service on the China Station, to date July 31st.

Meadus, W. H., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Meadus, William H., chief engineer to the *Ardent*, to date September 24th.

Melrose, James, chief inspector of machinery to the *Victory*, additional, to date October 1st.

Messervy, Charles de F., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

M'Ewen, G., fleet engineer, has been placed on the Retired List of his rank.

M'Gregor, William, engineer to the *Hornet*, to date October 4th.

Morris, Thomas, fleet engineer to the *Rodney*, to date September 22nd.

Noll, George W., chief engineer to the *Vivid*, additional, for the *Rattlesnake*, to date September 3rd.

Norris, Colin McK., chief engineer to the *Pearl*, to date September 30th.

Osborn, George, fleet engineer to the *Warrior*, to date October 6th.

Owen, John A., assistant engineer to the *Rodney*, to date September 22nd.

Parnall, Walter R., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Parsons, William G., fleet engineer to the *Edinburgh*, to date September 22nd.

Paterson, James A., assistant engineer to the *Mohawk*, to date September 30th.

Pearce, Richard H., engineer to the *Porcupine*, to date September 21st.

Pellow, Charles H., fleet engineer to the *Vivid*, additional, as engineer overseer for Hull District, to date July 11th.

Pendleton, F. B., engineer to the *Surly*, to date August 19th.

Pounds, T. H., engineer to the *Virago*, to date August 10th.

Pring, F., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Procter, Thomas G., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Radford, Henry G., assistant engineer (temporary) to the *Vivid*, additional for the *Arrogant*, to date September 16th.

Rawling, S., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Rawling, Sylvester, staff engineer to the *Conqueror*, to date October 6th.

Rayner, Alfred, staff engineer to the *Sappho*, to date August 3rd.

Reid, Walter S., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Reynolds, Thos. R., engineer to the *Barham*, to date August 3rd.

Reynolds, Harry E. J., assistant engineer to the *Sparrow*, to date October 6th.

Richards, John A., engineer to Hong-Kong Yard, to date August 27th.

Richardson, John, engineer to the *Prometheus*, additional, to date October 7th.

Ricketts, H. H., assistant engineer to the *Hecate*, to date July 23rd.

Riley, Edgar W. (probationary) assistant engineer to the *Centurion*, to date October 21st.

Rosevere, E. J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Rosevere, W. H., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.

Rule, Thomas, fleet engineer to the *Vivid*, additional, for the *Conqueror*, to date September 3rd.
Rundle, M., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Salter, A. G. V., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Sennett, Marrack, engineer to the *Otter*, to date September 11th.
Sharp, William, fleet engineer to the *Hecate*, to date October 11th.
Shattock, T., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Shorey, Charles E., engineer to the *Spanker*, to date October 19th.
Sillince, William P., assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.
Simmons, G. T., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Skelton, Reginald W., assistant engineer to the *Hero*, to date August 24th.
Sparks, Henry P., engineer to the *Rocket*, to date August 19th.
Sparks, E. F., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Sparks, Ernest F., chief engineer to the *Buzzard*, to date September 1st.
Stephens, Lindsay J., engineer to the *Plassy*, additional, to date October 22nd.
Stribling, William S., fleet engineer to the *Vivid*, additional for the *Doris*, to date September 3rd.
Stuart, Marlin, chief engineer to the *Bonaventure*, to date September 3rd.
Stuart, Martin, chief engineer to the *Doris*, until paid off, and then to the *Vivid*, additional, for the *Doris*, to date July 23rd.
Stuttaford, Frank R., chief engineer to the *Vivid*, additional for the *Northumberland*, to date September 4th.
Sutton, F. J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.
Taylor, Charles G., engineer to the *Quail*, to date August 10th.
Ter Veen, V. A. A., assistant engineer, has been promoted to be acting engineer in Her Majesty's fleet.
Ter Veen, Vernon A. A., acting engineer to the *Pigeon*, to date September 28th.
Thompson, Frank D., engineer to the *Terror*, to date July 30th.
Thompson, A. E., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.
Thumwood, Lewis E. chief engineer to the *Mohawk*, to date September 30th.
Toman, Richard W., engineer to the *Foam*, to date August 10th.
Tompkins, Albert E., chief engineer to the *Porpoise*, to date September 21st.
Turner, Henry J., engineer to the *Leda*, to date October 13th.
Watch, J. S., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.
Watkins, Benjamin J., engineer to the *Shark*, to date August 10th.
Westaway, A. E. L., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.
Westaway, Albert E. L., staff engineer to the *Flora*, undated.
Whayman, William M., engineer to the *Linnet*, undated.
Wheater, Percy, engineer to the *Wildfire*, additional for service in Reserve, to date August 7th.
White, Alfred J., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.
White, Arthur F., assistant engineer to the *Devastation*, to date September 30th.
Wickham, Henry J., (probationary) assistant engineer, has been appointed to the Royal Naval College, for study, to date September 30th.
Williams, W. K., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Marine Engineers' Examination.—At this examination held October 12th, 13th and 14th, Mr. Colquhoun, of Paisley, successfully passed for Extra First-class Engineer. He was prepared by Mr. Thorn, 5, Waterville Terrace, North Shields, and makes the forty-second successful pupil in the above grade from this establishment.

HOAR & BROWN'S HARDWOOD MARKET REPORT, OCTOBER 23rd, 1897.

Teak :—	Logs. Loads.	Planks. Loads.	Blocks. Loads.	Total. Loads.
Stock, Oct. 1st.	10,505	2,415	15	12,935
Landings ..	46	395	—	441
	10,551	2,810	15	13,376
Deliveries ..	742	308	—	1,050
Stock, Oct. 15th.	9,809	2,502	15	12,326

The market is still paralized by the effects of the strike, and there are no enquiries of any magnitude. The figures representing deliveries appear larger during the last month in consequence of several old orders having just been completed. The landings are comparatively small.

Inferior quality wood is being forced off by without reserve sales at low figures, and if this continues, prices will decline very much, but it is hoped that a more healthy and improved condition of the market will ultimately result.

Planks.—The stock continues to increase, but prices are firm for good averages and quality. There are many second and third class shipments being offered, both privately and at public sales. The low figures look tempting, but many of the parcels are dear at any price. Some shippers have lately advanced their C.I.F. figures, but while the stock remains so heavy here, it is unlikely that a rise in values will take place.

Mahogany.—During the latter end of September prices were getting very weak, and large sales were carried through at exceptionally low figures, but latterly values have strengthened somewhat, especially for better-class wood, and are likely to become firmer still.

Honduras.—The new season's Belize shipments are selling at advanced prices, there is, however, plenty following, and values may decline upon forced sales.

Tobasco.—The arrivals have been light, but wood from various other ports has replaced the want of this speciality.

Nicaraguan.—The decline experienced in the value of Mexican and African does not appear to affect this class of mahogany, the stocks are fairly light, and prices keep up to the old standard.

African.—Large quantities have lately arrived, containing small and inferior logs, which have been sold at "give away prices." The stocks are becoming lighter now, and a marked improvement has already been shown in the value of the larger, and straighter logs.

Cuba and St. Domingo.—The demand is light, no doubt owing to the high figures being asked for the few cargoes afloat. There is very little stock.

Cedar.—The tone is exceedingly firm, especially for Honduras wood. There have been a few odd parcels from outside ports, which have been used to fill up gaps at a reduced price.

The Paraguay stock is still heavy and consumption slow.

Walnut (American).—Small and inferior logs are ruling low, and the demand is very quiet, but for good shipments prices are fairly high, and parcels are easily placed.

Planks and Boards.—There is a plentiful supply of the second grade, and some low figures have lately been accepted for clearances. The higher grade stands at a premium, and is eagerly snapped up.

Whitewood.—Lower prices than have been known in the history of this wood are ruling now for inch boards, both first and second quality.

Logs are seldom enquired for, and planks of 3 to 6 in. thick predominate largely, but holders of this class have not yet come down in their idea of price.

Sequoia.—The sales have been frequent of late, and the stock in first hands has become small. There is no alteration in prices.

"**Sheikh.**"—The second shallow draught gunboat *Sheikh*, which Messrs. Yarrow & Co. have constructed for the Egyptian Government for service on the Nile, was successfully launched from their works at Poplar on October 13th. This vessel will be despatched to Egypt in about two weeks from now.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE engineering dislocation during the month has not assumed any very marked development in the Clyde and other Scottish districts, very largely because all beligerent measures have really been exhausted on both sides. Here and there, however, engineering and machine tool-making firms, who have had no quarrel with their own men, and who have conducted their businesses for many years apart from any federation of employers, and under the most cordial relationship with their workmen, have felt it incumbent on them to adopt the policy of the general body of employers and post up the lock-out notices when they saw that levies were being raised in the works in support of the men on strike. In every case almost where this has been done the official lock-out notice has been accompanied by lengthy explanations dealing in a friendly tone with the present demand for an eight hours' day, and pointing out how impossible it was to grant the curtailment of the working week by six hours, pay the same wages, and at the same time hope to retain our present share in the world's work, while the hours worked abroad were so very much longer and the wages paid so very much smaller. The lock-out notices have in all cases been met by the workers with strike—without notice—union and non-union alike coming out as a rule.

More recently, however, non-union men have been constantly breaking away from the ranks of the strikers and returning to work, and even members of the union have been doing the same, in spite of the violent efforts of the pickets and their henchmen to dissuade them. The fact is, efforts of this sort have now no heart in them, partly on account of their having brought many men within reach of the long arm of the law, and largely because it is sure to be effort thrown away. The fact is, very many of the works on the Clyde have never seriously been stopped at all; a few non-union journeymen and squads of apprentices having been able to keep matters going. In several shops night shifts have been the rule, and the non-union men and apprentices rather like their augmented earnings.

At the moment there is every hope being entertained on the Clyde as well as throughout the Kingdom, that the recent intervention of the Board of Trade may result in bringing about a conference between the leaders on both sides, and that eventually something like a settlement may be arrived at which will be acceptable. The Clyde employers' committee are meeting in Glasgow to-day (25th) to resolve upon the position they should take up at the executive meeting, which is to meet either to-morrow or next day for the purpose of drafting a reply to the proposals submitted by the Board of Trade. Similar meetings are, of course, being held at other centres in the Federation area. Among the Clyde employers the feeling seems to prevail that on no account should they agree to meet the men with a discussion upon the lessening of the hours of labour in view, but at the same time they fully recognise that intervention by the Government is a matter which calls for the most serious consideration.

While the shipbuilding contracts on hand in Clyde shipyards have in not a few cases been at a standstill during the month of October and part of September for the want of their machinery due to the engineering conflict on the eight-hours question, this has not by any means stopped the flow of fresh orders for ships probably not required in any great hurry.

About the latter end of September Messrs. Charles Connell & Co., Scotstoun, received an order from Messrs. Wm. Johnston & Co., Liverpool, for a screw steamer of about 6,400 tons gross register for the Atlantic trade to carry about 9,000 tons deadweight, also an order from Messrs. James Gairdner & Co., Glasgow, for a screw steamer of approaching 4,000 tons register, and about 6,000 tons deadweight capacity. Two cargo steamers of considerable tonnage were also ordered from Clyde builders in the latter end of September by Messrs. Maclay & MacIntyre, Hope Street, Glasgow.

Messrs. Carmichael, McLean & Co., Greenock, received, early in the month of October, an order from a Danish firm for a screw steamer of 2,450 tons deadweight capacity, 260 ft. long by 36 ft. beam and 20 ft. 4 in. moulded depth, the engines for which will be supplied by Messrs. Muir & Houston, Kinning Park, Glasgow.

Messrs. The Grangemouth Dockyard Co., on the Forth, have benefited to even a greater degree from the enterprise of the Danish owners above referred to. They have been instructed to build two steamers—the owners being the Cimbria Steamship Co., Limited, of Copenhagen, intended for general cargo carrying purposes, one with a deadweight capacity of 2,350 tons, and the other of 1,700 tons. The machinery for both these vessels will be supplied by Messrs. Hutson & Son, Glasgow, whose connection with the Grangemouth firms has been of long-standing.

The London and Glasgow Shipbuilding Co., Limited, of Govan, received early in October the order to build two first-class gunboats for the British Navy, to be named the *Dwarf* and *Thistle*, two of a set of six similar craft, four of which are placed elsewhere in the United Kingdom.

Messrs. Mackie & Thomson, shipbuilders, Govan, whose stocks are at present fully occupied—as many as three vessels being laid down on each berth—with the hulls of steam trawlers, not a few of which have been thoroughly completed for launching for some time, have just contracted to build six trawlers of 150 tons each, and two trawlers of 180 tons each for Grimsby owners.

The Fairfield Shipbuilding and Engineering Co., Limited, not being affected by the Engineering dispute are making headway with the important contracts they have on hand for both the Naval and Mercantile Marine. On the 28th ult. they launched the magnificent 7,000-tonner for Sir Donald Currie & Co.'s Castle Packet Line to the Cape, to which detailed allusion was made in last month's Notes. The vessel was named the *Carisbrooke Castle* after a village in the Isle of Wight, the castle dating from the sixth century. The *Dunluce Castle* is the name to be given to another large Currie Liner which is on the stocks at the yard of Messrs. Barclay, Curle & Co., Whiteinch. This vessel would have been launched some time ago had the engineering deadlock not rendered launching inadvisable meantime.

Messrs. John Reid & Co., Limited, Whiteinch, have contracted, since last month's Notes were written, to build two steel screw steamers each of 2,550 tons gross register, for the Campania Lud Americana de Vapores, the machinery for which will be supplied by Messrs. Dunsmuir & Jackson, engineers, Govan.

Messrs. William Denny & Bros., Dumbarton, are at present turning out—in pieces for shipment—a number of very large barges for the Amoor River, specially designed for carrying rails and machinery needed in connection with the great Trans-Siberian Railway project. They have also recently been instructed to build a 4,000-ton mail and passenger steamer for their good customers, the Union Steamship Co., of New Zealand.

Messrs. A. McMillan & Sons, Messrs. Denny's neighbours, contracted about mid-month to build a steel screw steamer of 5,600 tons deadweight, and Messrs. Scott & Sons, of Bowling, are to build a steel screw steamer of about 1,600 tons for Mr. William Robertson, Glasgow.

Messrs. Blackwood & Gordon, shipbuilders and engineers, Port-Glasgow, have contracted to build for Swedish owners a steel screw steamer, of 205 ft. length of keel and about 1,000 tons gross, mainly intended for cargo carrying, and fitted by the firm with triple-expansion engines.

With this and other orders recently booked, Port-Glasgow builders are without exception well situated as regards work, several of the firms indeed are exceptionally busy, notably Messrs. Russell & Co. and Messrs. William Hamilton & Co., the latter of whom have now on hand as many as nine steamers, aggregating 45,000 tons deadweight capacity. Their most recent contracts were for two steamers each of 5,400 tons deadweight capacity, one for Messrs. John Holman & Sons, London, and the other is also for London owners. The machinery for these vessels will be supplied by Messrs. David Rowan & Son, Glasgow.

Messrs. Russell & Co.'s latest accessions to the work on hand are two steel spar-decked steamers each of 3,580 tons gross, suitable for general trade, and a third steamer of 3,340 tons, all to be built to Lloyd's highest class. Messrs. Robert Duncan & Co. have booked a small steamer of 180 tons gross for Dutch owners, intended for coasting trade round India.

Messrs. David J. Dunlop & Co., Port-Glasgow, have received an order through the Agent-General for the Cape of Good Hope to build a powerful screw tug of 350 tons gross register to the order of the Table Bay Harbour Board. This steamer will be specially fitted for the towing of large vessels, and will have a

steam fire-pump to assist at conflagrations. She will be provided by the builders with two sets of triple-expansion engines of 1,600 H.P.

Messrs. A Rodgers & Co., Port-Glasgow, have received from Mr. William Robertson, Glasgow, an order for a steamer of about 1,700 tons gross register for engaging in foreign trade.

Messrs. Chambers Brothers, Greenock, about the end of September were instructed to supply twelve of their patent life-boats for the Hamburg American steamers, building by Messrs. Harland & Wolff, Belfast; also a number for their steamers being built by Messrs. R. Napier & Sons, Govan, for the Nippon Yusen Kaisha Co., of Japan.

The extensive works at Peterfield, near Renfrew, recently organised, are now fully occupied, by Messrs. Babcock & Wilcox, of water-tube boiler fame, and a large amount of work is on hand. There is, it is reported, an immediate prospect of another large public works being established on the banks of the Cart just below Messrs. Babcock & Wilcox's extensive premises. It is said that all the arrangements are completed for the feu, and that the principal output of the new establishment will be sugar-refining machinery.

The establishment of engineering works near Annan, Dumfriesshire, by Messrs. Cochran & Co., of Birkenhead, is likely soon to take place. This firm, it is said, have been negotiating with the proprietor of a suitable site, for some months, and that matters are now arranged. There is every prospect of the undertaking being an accomplished fact in the near future.

The shipbuilding yard at Ayr, occupied, until his death about two years ago, by Mr. Samuel McKnight, and since carried on by manager and staff on behalf of the Ayr Harbour authorities, who are proprietors of the premises and of the important hauling-up slip in connection with the yard, is about to be taken in hand by a new manager—Mr. Walter Scott—whose training for the past eleven years has been in the well-known yard of Messrs. Denny & Brothers, Dumbarton. Mr. Scott has had experience both in the outside practical work of the shipyard and in designing and preliminary processes in the drawing office, and has the good wishes of a large number of friends for his success in the new sphere he has been elected to fill at the "Auld toon o' Ayr."

The shipyard at Irvine, on the Ayrshire coast, which has hitherto not taken the place which was thought it should occupy amongst the outlying yards of the Clyde district, is being re-set-agoing under promising auspices. It has just been registered as a public company in Scotland under the designation of the Irvine Shipbuilding and Engineering Co., with a capital of £20,000 in £5 shares. The first subscribers are Mr. G. W. Rogers and Mr. Wm. Robertson, shipbuilders, Irvine; Mary Rogers, Helensburgh; Mr. W. A. Mackie and Mr. D. R. H. B. Thomson, shipbuilders, Govan; W. Wood, merchant, Glasgow; Henry S. Roger, clerk, Helensburgh. Company's office, The Shipyard, Irvine.

Much regret was felt throughout shipbuilding and engineering circles on the Clyde, and by the commercial community generally, when news became known of the death by drowning, on the 15th ult., of Mr. John Grant, the financial secretary of the Clydebank Shipbuilding and Engineering Co. The sad event occurred between six and seven o'clock in the evening while Mr. Grant was on his way home from the Clydebank Works. Passing along the banks of the Forth and Clyde Canal between Clydebank and Dalmuir, he somehow stumbled and fell into the water, striking the side in his descent. Although rescued from the water without much delay and restorative expedients tried, Mr. Grant succumbed. The deceased had been for very many years, previous to the formation of the concern into a public company, a trusted and valued official, having indeed been associated with Messrs. James and George Thomson long before that firm removed from Finnieston to Clydebank. He was between 65 and 70 years of age and a bachelor, and although of somewhat retiring habits had a large circle of warmly attached personal friends.

The patent corrugated copper lifebuoy manufactured by Messrs. Joseph Sankey & Sons, of Bilston, whose agent and maritime advertiser is Mr. David Pollock, 128, Hope Street, Glasgow, is meeting with most extensive adoption at the hands of owners of passenger ships on the Clyde and elsewhere. The Caledonian Steam Packet Co., the North British Steam Packet Co., the Campbeltown and Glasgow Steam Packet Co., Clyde Shipping Co., the Loch Lomond steamers, as well as those of Mr. David MacBrayne's fleet, have had a number installed during the season, and these owners contemplate the gradual outfit of all the vessels of their fleets with this type of buoy. Other companies who have adopted the buoy, and in most cases are giving repeat orders, are, the Irrawaddy Flotilla Co., the Partick Henderson Line, the Great Western Railway Co., the London and North-Western Railway Co., the London, Brighton and South Coast Packets, &c., &c. Made of 16 oz. copper, corrugated, in two halves, the joints being fitted "he and she," clenched over and thoroughly brazed, making the joints as strong as any part of the metal—the Sankey Buoy is practically indestructible, and always retains its extremely buoyant character.

Mr. James Deas, the well known engineer for the Clyde Trust, has recently returned from Germany, where he enjoyed a well-earned holiday, having left Glasgow a day or two after the visit of Royalty and the function of copestone laying at the Princes' Dock. In a forthcoming number of the well-known monthly magazine, *Good Words*, Mr. Deas will give a popular account of the construction of the new docks, his article being copiously illustrated from photographs of the dock works at various stages of their progress.

The "dead walls" of the Glasgow offices of Messrs. Suter Hartmann & Rahtjen's Composition Co., Limited, in Hope Street, are at present enlivened and adorned by a magnificent water-colour painting by Mr. S. Hines Cumming, of London, representing types of British and foreign warships afloat, to which the celebrated "Red Hand Brand" of Rahtjen's composition, manufactured by the firm, has been applied. The quantity annually absorbed in the work of coating the ships of our Navy is truly prodigious, and its actual figures are given at the base of the picture. The various vessels are represented floating on the sea, most artistically rendered with a gentle ripple disturbing its surface, and both in detail and in general outline the vessels are most realistically brought out. The picture deservedly attracts a good deal of admiration from the passers-by in the busy and central part of the city in which Messrs. Suter Hartmann's offices are situate.

Glasgow has now fully committed itself to the holding of a great international exhibition in 1901, and at a recent meeting of the promoters and guarantors it was intimated that no less than £200,000 had been subscribed to the fund. The site of the coming exhibition is to be at Kelvingrove—the same indeed in which the great and highly successful exhibition of 1888 was held. Since that time, and for most part an outcome of the surplus left over from that undertaking, magnificent art galleries are in process of construction, which will be thoroughly completed in 1901, and be included in the site of the exhibition. The year 1901 has been chosen partly because, as the great Paris Exhibition takes place in 1900, the Glasgow undertaking may secure many valuable exhibits after having been shown there.

Sunday sailing on the Clyde in spite of the impediments placed in its way by the scandalised pier authorities of Dunoon and other watering places, has been a pecuniary success, whatever it may have been otherwise, and the owners of the paddle steamer *Victoria*, which has been engaged all summer in the service, contemplate a development of the service for the spring, summer, and autumn of next year. It is proposed to open up the piers of the Island of Arran and those on Loch Fyne, and to extend the runs as far as Campbeltown, for which purpose it is intended to re-engine and re-boiler the *Victoria*, and to provide an entirely new paddle steamer like the *Glen Sannox*, one of the swiftest and most palatial of Clyde river steamers. So far the capital in the Sunday sailing enterprise has all been privately subscribed, but the directors intend shortly to issue shares amounting to £20,000 to the general public.

The largest plate roll ever cast in Scotland, exceeding by ten tons the heaviest roll at present in use in Scotland, has, during the month, been produced at the foundry of Mr. R. B. Tennent, Whifflet, Coatbridge. As is well known, one of the greatest difficulties manufacturers of the steel plates now employed in boiler-making and in shipbuilding have to contend with is the procuring of rolls of sufficient size, weight, and strength to carry out the work involved. Many attempts have been made in Scotland to get a mass of iron consolidated into such a form as to be easily and satisfactorily turned into a roll. Somehow faults have declared themselves in the process of turning, owing to the large size of the block, but more especially due to the composition of the molten metal, apt, under ordinary circumstances, to be heterogeneous. The subject was taken up by Mr. Tennent, and in its pursuance he visited many of the

casting forges in Germany and has at last been able to solve the difficulty. The plate roll turned out by him is what is known in the trade as a grain roll, and is one of a set that is to be sent to a large manufacturing firm in England for turning out steel boiler plates. The roll is 42 in. in diameter and 19 ft. long, the molten metal required for the rough casting being over 400 tons! When finished on the lathes at Mr. Tennent's works at Whifflet, the roll will weigh 33 tons.

An alarming and destructive fly-wheel accident took place in the machine-tool making works of Messrs. John Lang & Sons, Johnstone, on the morning of the 18th ult. Without warning, the fly-wheel of the main driving-engine burst into fragments, with effects disastrous enough to buildings and tools, but happily without damage to human life. In the direction in which the fly-wheel was revolving large portions were projected through the roof of the engine-house, one part weighing 3 cwt. falling 200 yards off, and another of about 10 cwt. rising and falling in an almost perpendicular line, doing considerable damage to the roof of the works. Another fragment carried away one of the large windows of the works, wrecking a planing machine in its route. Naturally a good deal of damage was done to the fittings around the engine. Fortunately the mishap occurred before many men were in the works or on the street, and, as has been said, no one was injured. The accident probably would not have happened if the works had been fully in operation, but the load being so small on account of the stoppage of machines through the lock-out and strike, the governor failed to meet the extraordinary demands made upon it, with the result that the excessive velocity attained by the engine brought about the bursting of the fly-wheel. Although the damage is extensive, little or no interruption to work will result. The firm are introducing electro-motors for the driving of machines in an extension of their present works, and power from these motors and electro-generating plant will meantime be utilised.

It is not very often that the breaking of a steamer's tail-end shaft in mid-ocean is eventually followed by the loss of shaft and propeller as well, but this occurred in the case of the steamer *Victoria* on 24th May last, while on a voyage from Cardiff to Sabine Pass, Texas. This accident was the occasion of an engineering feat in Mid-Atlantic, and in very unsettled weather—viz., the fitting of spare shafting and propeller—for which Lloyd's bronze medal for meritorious service has recently been presented to Mr. John Sandeman, belonging to Broughty Ferry, the chief engineer of the vessel, which is owned by Messrs. Taylor & Sanderson, of Sunderland. Mr. Sandeman and his second engineer, Mr. Joseph A. Davidson, assisted by the crew, exerted themselves for eleven days in mid-ocean, and eventually succeeded in fitting the spare tail-end shaft and propeller with which the vessel was provided, and she arrived at Sabine Pass 13 days overdue. The owners of the steamer state that this is the first engineering feat of its character that they know of that has been carried out in mid-Atlantic; and in addition to Lloyd's medal Mr. Sandeman has been presented with an illuminated address and a substantial sum of money.

Messrs. Beardmore, of Parkhead Forge and Iron and Steel Works, are supplying at the present time plates of nickel-steel, which will go towards the making of a boiler to be fitted into a big steamer belonging to Messrs. Donald Currie & Co., employed in connection with their liners at the Cape. In adopting this steel the makers will save as much as 10 per cent. in the weight of the boiler, and the advantages in other respects will be considerable. It is only by tentative experiments in tugs, pleasure yachts—and, curious to think of, in ships of war—over which our conservative Board of Trade have no jurisdiction—that the utility and desirability of many things can be demonstrated, and doubtless this case of a nickel-steel boiler will be watched with interest.

An experiment in deep-sea diving of considerable interest to all connected with shipping and ship-salving, was carried out one day recently on Loch Long off the Firth of Clyde, the main object of which was to demonstrate the utility and value of the Buchanan-Gordon diving dress, which although primarily intended for use in pearl and sponge diving, is also, of course, available for deep-sea salvage operations. In the course of the experiments in Loch Long, in the presence of a large number of gentlemen, Mr. W. R. Walker reached a depth of over 31 fathoms, which is very much in excess of the usual depth regarded as safe and practicable by professional divers hitherto. Our Admiralty limit their seamen divers to a depth of 20 fathoms, and the well-known firm of submarine engineers, Messrs. Liebe, Gorman & Co., London, consider from 23 to 24 fathoms a fairly good maximum under ordinary conditions. Of course, cases of this depth having been exceeded are not unknown, instances being the salving of the specie from the wreck of the *Alphonso XII.*, at a depth of close on 27 fathoms, and more recently from the wreck of the *Skyro*, off Cape Finisterre, at a depth of 28½ to 30 fathoms. Even these unusual depths have been exceeded on several occasions, notably in the case of James Hooper, who descended off the west coast of South America, to the astonishing depth of 34 fathoms.

The modern diving dress and apparatus admit of air being supplied to a man at work in as great a depth of water as his powers to resist the pressure will permit, and it is in this respect that the Buchanan-Gordon dress would seem to possess advantages. The dress, which is the invention of Mr. W. W. Gordon, of Melbourne, and owned by the Buchanan-Gordon Diving Dress Co. of that city, is virtually a suit of armour, relieving the diver of the water pressure and enabling him to move about and exert himself with comparative freedom. The helmet is composed of copper, and the arms and lower part of the dress consist of spiral springs imbedded in a patent material which is calculated to resist a pressure of 220 lbs. per square inch. The total weight of the dress is 3½ cwt., and by the style of construction the important advantage is secured of distributing its weight all over the diver's body instead of concentrating such on the feet and shoulders. The invention is being brought before the Admiralty authorities with the view of its being adopted in their mining and other submarine operations.

Although, like shipbuilders in other centres, those at Dundee are somewhat hindered in bringing the vessels on their stocks to the launching stage, an optimistic belief in the settlement of the engineering conflict seems to prevail, and orders for new tonnage are being booked. The Caledon Co., who have already one steamer on hand for Messrs. Thomas Wilson, Sons & Co., Hull, have undertaken to build and engine two additional vessels for the same company. The new boats will be slightly larger than the one at present under construction which measures 230 ft. in length, 32 ft. beam, and 17 ft. moulded depth. The Caledon Co. have also on hand a steamer of considerable tonnage for the Clyde Shipping Co., and a cargo and passenger coasting steamer for Messrs. M. Langlands & Sons, Glasgow. Messrs. Gourlay Brothers & Co. have now closed the contract with the General Steam Navigation Co. to build for them a fast passenger steamer of 270 ft. in length. The new vessel will be elaborately fitted up, and is to be ready for next season's pleasure traffic from the Thames. Messrs. Gourlay have just tried for speed, and handed over to her owners—the Nederlandsche Stoomboot Maatshapptj, of Rotterdam—the *Batavier II.*, of 1,140 tons and 13½ knots speed, and are progressing satisfactorily with the fitting out of a sister vessel, the *Batavier III.*, launched about the middle of last month. The Dundee Shipbuilders' Co. have altogether eight vessels, large and small, on hand, and a steel pontoon dock 170 ft. long for the Roumanian Government.

The Dundee Harbour Trustees having found that the graving dock rates in force had the effect of frightening customers away from their port, resolved on the 21st September that after the 1st October the rates for the use if the graving docks should be altered to 1¼d. per registered ton per day of 24 hours for the first 48 hours. After 48 hours the rate is to be 1d. per registered ton per day. The rate for pumping the docks and for the use of caps for keel blocks, and for cleaning the docks are to be included in the foregoing rates. There is a feeling that other harbour trusts besides that of Dundee, should in the same way overhaul and reduce their graving dock rates.

Leith Dock Commissioners are at present hesitating whether to at once extend the wet dock which has been under construction since 1893, or only to carry out the works to their original limits, with the probability of having, within a period of 10 or 12 years, to compulsorily go in for extension at a very much greater proportionate outlay. At a meeting of the Commission held on the 8th inst. the Works Committee submitted a report which showed that the proposed extension by itself could be made for between £80,000 and £95,000, but that if extension should be agreed upon as necessary it would be better and cheaper to carry it out as part of the present works as about £25,000 would be saved thereby. Some members thought that the new dock would be good for 10 years for all that would be required The cost of the extension in the end

would come to £110,000. There would have to be paid during the 10 years £46,000 in interest and sinking funds and £12,000 would be lost by delaying the opening of the new dock one year, or in other words, there would be a loss of £58,000. After considerable discussion the matter was remitted to the Finance Committee to report, the Commissioners not committing themselves as regards the proposed extension. There is, however, a pretty confident belief that the decision at next months' meeting will be to go on with the extension.

The dock at present being constructed was begun in 1893, and within a reasonable time it will be ready for occupying. When the "Edinburgh" Dock, the newest of the Leith docks already in use, was opened in 1883 there was practically no American trade, whereas to-day it is pretty extensive—direct lines of steamers being run to New York, Baltimore and Montreal—and the probabilities are that in the future it will grow still larger. Everything points to the cargoes being carried in very large steamers; hence the new dock. The continental and coasting traffic has also increased. In short, within the last 10 years the trade of the port has grown more rapidly than in any previous decade. In the year 1881 the shipping of the port barely reached 1,000,000 tons, whereas now it is 1,700,000 tons. The superintendent of the Leith Harbour and Docks, since 1883, is Mr. Peter Whyte, C.E., who was for 16 years acting engineer and assistant to the general manager of the Bute Docks at Cardiff.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—It is quite evident that shipowners look upon the disastrous struggle in the engineering trade as being very near its close, for they are no longer showing that hesitancy about adding to their shipping property, which was noticeable a few weeks ago. During the present month a considerable number of orders have been distributed among the leading shipbuilding centres, and enquiries are still pretty numerous. It is not only the shipowners who seem to have become impressed with the conviction that the engineers purposeless struggle is nearing the stage of collapse, but the builders also, and all other classes who are in any way connected with shipping, appear to have fully realised the same momentous fact. There is, indeed, reason to believe that the men themselves are aware of the hopelessness of their case, and even the leaders are beginning to show symptoms of "funk" behind their outer armour of bravado. In the August number of the MARINE ENGINEER, when the strike had fully declared itself, we ventured upon a forecast of the probable results, which has, so far, been amply verified. We said the struggle would be long and bitter, that the employers had "put their backs to the wall," and would not waver in their determination to have their own way for once, and we plainly indicated our belief that no proposals for compromise would be entertained, and that the struggle could only be terminated by the unconditional submission of the men. The whole of the forecast has not yet been fulfilled, but we have not the smallest doubt that it will be, and that very shortly. In referring to the strike we have used the word "disastrous"—of course it must be so regarded when account is taken of the suffering that is caused by it. It must also be considered disastrous to the expectations of the socialist mountebanks, who through some unaccountable misfortune have for the nonce got the "lead" of the operative engineers; but to the trade of the country, and to the interests of the engineering community especially, it will not, we should hope, prove an unmixed evil. For the moment trade is undoubtedly being diverted to other countries, the employing interest is being subjected to enormous loss, but great as the price is we think it will be found well worth paying for the advantages that must accrue. Trade Union interference in the management of works had reached a point which no self-respecting employer could continue to regard with toleration, and which was in every way inimical to business. It was indeed hard that a capitalist after having built works and equipped them with costly machinery, could not set on whom he chose in his own shops, or apportion the work to be done in accordance with his own judgment and desire. Even the tools which were bought with his money could not be used excepting with the consent of the Union delegate, who really had more power than either the foreman or manager, or even the employer himself. This reign of terror, or at all events of usurpation, is now practically at an end, for it is what the employers are fighting to put down, independently of their resistance to the eight-hour day. To be able to start any man without let or hindrance, and put him to any work he may be able to perform, without fear of interdiction from the shop steward, constitute advantages of incalculable value, and their possession will eventually more than make up for whatever loss is now endured.

The result of the voting in the branches of the Boilermakers' and Ironshipbuilders' Society, on the proposed incorporation of the shipyard drillers with that body, has been declared, and is largely against the proposal, the numbers for and against respectively being 6,349 and 24,173. Quite an exceptional degree of interest has been exhibited by the members in this matter, as shown by the number voting (30,522), which is greatly above the average, and which has not, we think, ever before been reached, no matter how important the question. Indeed, if we deduct the number of members receiving "benefit" of one kind or another, the vote referred to should very nearly approximate to the full strength of the society. It may be remembered that in the August report of the society, and also in the September report, the Executive Council very strongly urged upon the members the desirability of accepting the alliance of the drillers, and gave many weighty reasons why the smaller body should be taken into the fold of the larger. With the September report, however, a protest from the Liverpool members *against* the proposal was distributed, and this pithy document evidently had more weight with the members than the laboured disquisition addressed to them by the Executive. Time was when the ruling power had only to say "Vote so-and-so," and its behest was obeyed; but a feeling of impatience seems to have arisen amongst the rank and file, and this may lead to awkward complications in the near future. Mr. Knight has hitherto been able to keep his men well in hand, so long as they were content to jog along in the old beaten track; but they seem now to have become almost tired of the wholesome restraint that was put upon them, and it will take a leader of very clear head and strong fibre to guide them safely in the future.

The Palmer Co. have booked heavily since August, and have now as much work on order as will serve to keep the Jarrow yard busy well into next year. A rumour is current that the company will utilise their Howdon yard for the building of the torpedo-destroyer ordered a short time since by the Admiralty, and in view of the great quantity of merchant work they have to deal with, it seems probable enough that they may do so. The company's steel works and iron rolling mills, &c., are at present exceedingly active, and it is stated that for some time to come the whole of the output will be absorbed in supplying the company's own requirements in the shipbuilding and boiler building departments.

Messrs. Robert Stephenson & Co. have been commissioned by Messrs. W. Cory & Son, Limited, of Blackwall, to build an iron derrick pontoon, to be used on the Thames in connection with the discharging of coal cargoes. It is understood that not less than 3,000 tons of material will be used in the building of the structure. The pontoon which the firm are building for the Spanish authorities—which when finished will be the largest in existence—is well advanced towards completion, as are also three ships that are on the stocks.

The opinion to which we gave expression in the October number, to the effect that Messrs. C. S. Swan & Hunter's pontoon yard would not be long without a successor to the massive floating dock which the firm despatched to Havana (in tow of two steamers) a few weeks ago, has not been long in receiving verification. It is now announced that the firm have received an order to build for the Vulcan Shipbuilding and Engineering Co., of Stettin, a pontoon dock to accommodate vessels up to 15,000 tons displacement, and 550 ft. in length. It is understood that early delivery is stipulated for, and there is little doubt that this will be given, as there is no fear of the contract being delayed through any unexpected prolongation of the labour conflict which is now dislocating the trade of the country. Under existing circumstances this accession of work comes most opportunely, for shipbuilding is temporarily impeded, and there is much need of work for the unemployed shipyard hands. Through the remarkable enterprise of Messrs. Swan & Hunter,

the local workmen will be provided with employment during the winter—is it to be supposed that they will ever give a thought to the service done them?

Messrs. Whitworth, Armstrong & Co. are building, at their Low Walker yard, a new type of merchant ship, which in appearance partakes of the character of the "trunk" type. At the company's Elswick establishment preparations are being made for putting down another warship, which, it is said, will have a displacement of 15,000 tons. Messrs. Wm. Dobson & Co. are about to lay down, to the order of French owners, a twin-screw steamer of moderate size. Messrs. Wood, Skinner & Co. have their berths fully occupied; but at Messrs. Wigham Richardson & Co.'s yard there are some vacancies.

The Tyne Shipbuilding Co. have a fair amount of work in hand, and at Messrs. Readhead's establishment activity is still the feature. At the small yards there is a good deal doing in the building of fishing vessels, and some of the graving dock establishments have good repair contracts in hand. As the winter approaches, repairing work is bound to become more plentiful. In the building of ships' boats there is but a limited amount of work being done.

Engineering.—It is reported that at all the marine engine works the output capacity has been considerably increased during the month, through the return to work of non-unionists who had come out on strike in sympathy with the union men. It is certain that a large number of the class mentioned have gone back to their posts at the Elswick works. Now that the strike pay of the union has been reduced, it is thought probable that many of the latter will follow the example of the non-unionists. Messrs. Emerson, Walker & Thompson Bros., have been among the most recent additions to the ranks of the federated masters. There is indeed scarcely an engineering firm of any note in the district but have by this time enrolled themselves under the banner of the Federation.

Mr. W. F. Snowdon, of No. 2, Side, Newcastle, has brought out a patented speciality in boiler-covering, of which we hope to give an illustrated description in an early number.

The New Steel Supply Co., if 15, Queen Street, Newcastle, are developing a good business in the sale of anvils, vices, &c., made of the best Swedish crucible cast steel, of the "Sodersford" brand, and forged complete in one solid piece of cast steel. This method of manufacture renders the anvils much more durable than anvils of the ordinary kind, which are made from wrought iron, and merely faced with steel. These anvils are of excellent design and workmanship, and possess such a high degree of lateral strength that they can be made considerably lighter than ordinary anvils of equal working service. These anvils are symmetrical in appearance, and beautifully finished, and it is a matter greatly in their favour that the cost does not exceed that of wrought iron anvils by makers of repute. They are being largely adopted by the principal engineers, shipbuilders, &c., in the North, and have been introduced with satisfactory results in the works of Her Majesty's War and Admiralty departments.

The works of Messrs. John Spencer & Sons, Newburn, continue to show a fair degree of briskness; but many of the forges in the district have begun to exhibit signs of slackness.

The new works started early in the year at Gateshead by Messrs. Thos. Proctor & Son, manufacturers of ships' tanks, ventilators, &c., continue in active operation in spite of the fact that articles for steamship equipment are not in such demand as they would unquestionably be if the normal course of business had not been interrupted by the engineers' strike.

THE WEAR.

Shipbuilding.—Early in the month Messrs. Doxford intimated to their workpeople that they would be forced to temporarily discontinue operations in the shipyard, the work being as far advanced as was expedient in view of the impossibility of getting engines in time. The intimation has since been acted upon, and the men of the yard, amounting to some 1,500, have been laid idle. We are pleased to hear, however, that within the past few days operations have been to a small extent resumed in connection with the building of the torpedo destroyers recently ordered by the Admiralty, employment has thus been provided for a small number of hands.

Messrs. Short Brothers seem to be but little affected by the strike, most of the vessels in progress at their yard having to be engined by Messrs. Allan & Co., who, being outside the masters' federation, are not involved in the dispute. The yard, in fact, was never busier than at this moment, and it is known that the firm have other work to proceed with besides that now on the stocks.

At Sir James Laing's yard the satisfactory state of briskness previously noted is undiminished, and the yard of Messrs. R. Thompson & Sons has all the berths filled. Messrs. Pickersgill are putting down keels for two steamers—both for owners at Liverpool—and a good winter's work at this establishment is assured. At Messrs. Priestman & Co.'s yard business is fairly active.

It is stated that Messrs. J. L. Thompson & Sons have received an order from a West Hartlepool firm for a steamer of 4,100 tons gross, and another for a vessel, of somewhat similar capacity, from owners at a different centre. The firm have, throughout the whole of the present year, been very quick in filling the places of vessels put into the water, and it is safe to say that, in the time indicated, no berth in the yard has remained unoccupied for more than a week. The new joiners' shop—which is a substantial brick building—is well advanced towards completion, and will probably be ready for the putting down of the extensive equipment of plant that is intended for it by the middle of December.

As stated in last month's Notes, the Sunderland Shipbuilding Co. have booked orders, and the rumour is abroad that quite lately they have further increased their prospective work engagements. A rumour is also current that the adjoining establishment of Messrs. Bartram & Sons will very shortly have to be "laid in," as the work of the two vessels on the stocks has been pushed to such an extent that nothing further can be done till one of them is launched. This appears to be out of the question, however, as the engines are not ready, and it would be useless keeping the vessel in the water for an indefinite period.

Messrs. Blumer & Co. are about to commence the construction of a steamer of much larger dimensions than any yet built by the firm. Messrs. Austin & Son are exceedingly busy on repair work, and at the Bridge Dock there is also a considerable amount of work in hand.

Engineering.—It is understood that Messrs. George Clark, Limited, have succeeded in retaining the services of a large proportion of the men who were employed in the works prior to the strike, and that the output has, consequently, fallen very little short of the average. A very fine vessel recently launched from the yard of Messrs. Short Bros. has been fitted by the firm with her machinery, and has since had a satisfactory trial. The works of Messrs. Allan & Co. still keep busy; and at the establishment of Maccoll & Pollock an amount of work has been secured which will last the firm for some months. Among the orders booked is one for a set of duplicate engines, to be supplied to a vessel building on the Tyne.

The Wearmouth Foundry, Monkwearmouth, is expected to close for a period in the course of a few days, and more than three-fourths of the workmen have already been discharged. At most of the other foundries the state of business is unsatisfactory. The Sunderland Forge is still kept going steadily, but at most other establishments of a similar kind work is slack, and in more than one instance operations have been entirely suspended. Brass and copper works are only moderately well employed, but local iron works continue to do a fair amount of business. An electrical and general engineering exhibition, for which a new building of extensive proportions has been specially erected, is announced to be opened on November 22nd. It is understood that a large number of important firms have notified their intention to be represented, and it is expected that the collection of exhibits will be of quite exceptional interest.

The Hartlepools.—It is stated that Sir W. Gray & Co. have received from a Hull firm an order for a vessel of 5,000 tons capacity. The engines will probably be supplied from the shops of the Central Marine. Messrs. Thos. Richardson & Sons have, among other orders, one for a set of engines of exceptional power for a mail boat building at Middlesbro'.

The Hartlepool Steel Works are kept fully going, and there is a well sustained demand, sufficient to absorb the whole of the output.

At the Docks business in the timber line is good, and there continues to be a brisk and very opportune demand for labour. In the coal shipping department, business is fairly active.

Stockton.—Messrs. Ropner & Co., though having plenty of work to go on with, provided there was no obstruction in the way of getting vessels engined, have found it necessary to

close their yard for a time, the vessels on the stocks being as far advanced as is desirable before launching.

Messrs. Richardson & Duck are reported to have booked an order for a vessel of average size. At the boiler works of Messrs. Suthron & Co. work is very brisk.

Middlesbro'.—There is little change to note at this centre, the shipbuilding establishments of Sir Raylton Dixon and Messrs. Craggs & Sons being both very well employed. Local engine works and foundries are moderately busy; but steel works are not particularly active. At the Docks there is considerable activity, timber imports having recently been very numerous.

Darlington.—The well-known forging establishment at this centre is still kept going steadily, notwithstanding the engineering dispute, which is exercising a crippling influence on kindred works elsewhere.

THE MERSEY.

(From our own Correspondent.)

WITH the continued and steadily extending lock-out and strike, it is difficult to report on the position of the engineering industries throughout this district, the present abnormal situation affording no reliable basis upon which any opinion of much value can be formed. There are, of course, some sections which are not appreciably affected by the dispute. With one or two exceptions the boilermakers throughout Lancashire still remain outside the employers' federation, and they are generally well engaged. There are also several important engineering concerns that it has been well understood from the first would not co-operate with the federated employers, and these are, of course, securing whatever advantage is to be obtained from the present dispute. With regard to the engineering establishments that are combined in the lock-out and strike, the position, where they are not almost entirely dependent upon trained and highly skilled labour, may be said to be gradually improving, and many of the works are filling up their shops with outside labour which is sufficient for their purpose, or are training up unskilled men to operate the ordinary machine tools. In this way some establishments have been able to get within two-thirds of their ordinary output, and such large establishments as Sir William Armstrong, Whitworth & Co., Limited, of Gorton, and Platt Bros., of Oldham, have, between them, probably from six to seven thousand men already at work. In the higher-class engineering trades, and particularly amongst the special machine tool-makers, comparatively very few skilled workmen have so far been permanently secured. Borers and turners have been got occasionally, but for the most part they have been subsequently induced to leave by the men who are on strike, and one important works has found it preferable to close the shops altogether, while one or two others are pretty much in the same position.

During the past month considerable additions have been made to the list of firms locking out in the Lancashire district, these including establishments in Ashton-under-Lyne, Blackburn, and Liverpool districts, whilst another Manchester firm, Messrs. Madan & Co., have also joined in the movement. The employers' federation are apparently not at all relaxing their endeavours to bring into the combination every engineering firm whose co-operation can possibly be secured, and there is no indication whatever of any departure on their part from the firm position they have taken up—which is one of absolute rejection of any proposals for conferences or compromise. The unsuccessful attempt of Mr. Ritchie to induce the employers to meet the workmen's representatives amply confirms the above statement, and it is scarcely likely that the efforts now being made by the Federation of Engineering and Shipbuilding Trades Unions with a view of bringing about a conference under the provisions of the Conciliation Act will meet with any better success. The employers in this district are so assured of success in their present movement that in many cases they have been discussing the question of demanding a return of the 2s. per week advance in wages which was wrung from them by the trade unions a year ago, when the present federation had not obtained a footing in the Lancashire district. It is, however, unlikely that this question will be mixed up with the present dispute, but when the rush of work following the termination of the present conflict is over, and there is any indication of slackening activity this matter will no doubt be brought prominently forward. Whilst the position of the employers has steadily gained in strength the financial position of the workmen's union is becoming increasingly critical. One important organization, the United Machine Workers' Association, has acknowledged that it is utterly insolvent, its weekly expenditure exceeding the income by over a thousand pounds. Other of the societies are getting into the same position, and that the Amalgamated Society of Engineers has more grounds for anxiety as to its financial position than the officials care to admit is evident from the fact that a vote is being taken for an increase in the contingent levy on the members who are at work, whilst the scale of payment to members on strike is also, we understand, being reduced. The Amalgamated Society of Engineers has still about 3,000 men receiving strike pay in the Manchester district, the Amalgamated Machine Workers 500, the Toolmakers, Braziers, and Brassfounders combined about 200. Under the circumstances above described the employers are looking for an early termination of the dispute in the complete exhaustion of the trade union resources for carrying on the struggle, but no definite opinion is expressed as to how much longer the conflict may be protracted.

Messrs. Laird Bros., of Birkenhead, state that there is nothing new to report with regard to the shipbuilding trade, operations at their establishment being of course almost entirely dislocated owing to the engineers' dispute.

The industrial development which is going on in the neighbourhood of the Ship Canal is making rapid progress, and portions of land are being taken upon Trafford Park for works purposes. At the Barton end of the park preparations are being made for the erection of new patent fuel works, for the accommodation of which a wharf will be constructed on the canal banks, and a large corn mill is being built near the site of the old mills at Barton, which were demolished during the construction of the canal.

Generally during the past month, a steady tone has been maintained in the iron market here. The demand is only very moderate, consumers as a rule simply covering bare hand-to-mouth requirements, but makers show no disposition to give way in their prices, notwithstanding merchants are underquoting in some brands of pig-iron. Local makers still hold to about 45s. to 45s. 6d. for forge, to 48s. 6d. for foundry, less 2½, and Lincolnshire 43s. for forge to 45s. 6d. for foundry, with Derbyshire ranging from 46s. 6d. to 47s. 6d. net cash, delivered Manchester. In outside brands there has been a decided upward move—good foundry Middlesbrough is not now quoted under about 50s. 10d. to 52s. 4d. for prompt delivery by rail Manchester, representing an advance of 1s. on last month's rates, although merchants would accept forward contracts under these figures. With regard to Scotch iron prices have shown some irregularity, but generally any alteration has been in an upward direction. Glengarnock now averages about 46s. 9d. to 47s., with Eglinton 47s. 6d. to 47s. 9d. delivered Mersey ports, with 2s. 3d. per ton above these figures quoted for delivery at the Manchester docks. There have been no arrivals of American pig-iron of any weight, and ordinary brands continue to be quoted about 46s., with 50s. asked in some cases for special brands, net cash, delivered Manchester.

Finished iron makers have been kept pretty well engaged on orders in hand, but there is an easier tone in prices for bars, local qualities being readily obtainable at £5 12s. 6d.; North Staffordshire bars remain at £5 17s. 6d. to £6 2s. 6d.; sheets still average £7 to £7 2s. 6d.; hoops are only in poor demand, but are without alteration in price, Association list rates remaining at £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, and 2s. 6d. less for shipment.

In the steel trade, excepting a fair demand for some descriptions of manufactured material for structural purposes, business is slow, with prices low, ordinary foundry hematites being still obtainable at 56s. to 56s. 6d., although 58s. 6d. less 2½ is quoted for some special brands; local billets, £4 6s. 3d. net; steel bars, £6 to £6 5s.; girders to be bought at £6 to £6 5s.; common steel plates, £5 10s. to £5 12s. 6d., with boiler-making qualities £6 to £6 2s. 6d., delivered in this district.

Business in the metal market is necessarily very much restricted owing to the suspension of demand caused by the stoppage of engineering works, brass foundries, and coppersmiths' works, but prices are unchanged, and any reduction in list rates for manufactured goods is very improbable. Delivered in this district solid drawn brass boiler tubes are quoted 7½d., condenser

tubes 8½d., copper tubes 8¾d., brazed copper gas and steam tubes 8½d., brazed brass tubes 7¾d., rolled brass 5½d., brass wire 6d. to 6½d., copper wire 7d. per lb.

The timber trade shows no material change. Imports generally have been more than ample, and deliveries have been affected to some extent by the engineers' strike, with the result that stocks of several of the leading articles have accumulated and are now too heavy. Prices have been difficult to maintain, but there has not been much decline in value. Of East India teak imports have been too heavy, and although values are steady, the stock is excessive. There have been no arrivals of greenheart, and with a good demand stocks have been reduced to reasonable limits.

During the greater part of the month there has been an active demand upon the better qualities of round coal suitable for house-fire purposes, and pits have been kept on full time, with better prices obtainable. The more open weather towards the close, however, has caused rather a slackening off in the demand, and the full maximum rates that were quoted at the commencement are not in all cases being held to. Best Wigan Arley, however, is not quoted under 10s. to 10s. 6d.; Pemberton four-foot and seconds Arley, 8s. 6d. to 9s.; common house-coal 7s. to 7s. 6d. per ton at the pit mouth. The lower descriptions of round coal are only in limited request for steam and forge purposes, the continued stoppage of engineering works necessarily tending to restrict the demand, and prices are not more than steady at about 6s. to 6s. 6d. per ton at the pit-mouth. Engine classes of fuel are in fair demand, but supplies are ample, and the threatening outlook in the cotton trade necessarily has a depressing effect upon the market. Prices are without quotable change, a very fine tone being maintained as regards forward contracts, but there are low sellers in the open market for temporary clearance sales. At the pit-mouth common slack averages 3s. to 3s. 6d., medium 3s. 9d. to 4s. 3d., best sorts 4s. 6d. to 4s. 9d. per ton.

In the shipping trade an active business has been reported and better prices have been obtainable, good qualities of steam coal averaging 8s. to 8s. 3d. delivered Mersey ports, with about 8s. 3d. to 8s. 6d. quoted for delivery Manchester Docks.

BELFAST TRADE NOTES.

(From our own Correspondent.)

THE Engineers' lock-out, which appears to be the all-absorbing topic of the month, has undergone little or no change so far as Belfast is concerned. The only noteworthy feature was the holding of what was meant to be a monster representative demonstration of all the trades, with the object of inviting sympathy (and dollars!) from the public. The tradesmen marched in procession, headed by their various bands and banners, to the Ormeau Park, where speeches were made by Mr. John Burns, M.P., and other prominent trade union leaders. The demonstration passed off very quietly for Belfast, and, if it did little good, has apparently done no harm.

Rumours of a persistent kind are being circulated at the present that the firm of Messrs. Harland & Wolff are at last about to fall into line with the Employers' Federation. Should this prove to be the case it will undoubtedly prove a most severe blow to the A.S.E., and should go far towards bringing the dispute to a close, at least earlier than it would otherwise. So long as the Queen's Island Works keep going the levies from the engineers employed there will practically make the Belfast branch self-supporting for an indefinite period, but in the event of the extension of the lock-out funds would have to be drawn from elsewhere.

It is sincerely to be hoped that, whatever happens, and however improbable it may seem to appear, an early understanding will be arrived at, whereby work may be resumed to the advantage of employers and employed.

On the 12th inst. Messrs. Harland & Wolff made another attempt to break the record for big ships, the vessel in question being the s.s. *Cymric*, for the well known White Star Line, of Liverpool.

She is admitted to be the largest cargo vessel ever put into the water, and is the thirty-sixth steamer constructed for this line by Messrs. Harland & Wolff.

Her dimensions are:—Length, 600 ft.; breadth, 64 ft.; depth, 42 ft.; with a gross tonnage of 12,300 tons, and displacement, 23,000 tons. The propelling power consists of quadruple-expansion twin-screw engines constructed by the builders and working at a boiler-pressure of 200 lbs.

The *Cymric* will be fitted with the latest type of cable fittings in the upper and middle deck, capable of carrying 830 head of cattle, also permanent stalls for a large number of horses.

With the addition of the *Cymric* the White Star Atlantic Fleet will alone include eight new steamships, of the highest class, and all propelled by twin-screw engines which, as an element of safety, cannot fail to be favourably recognised by passengers, shippers, and underwriters.

During the month the new steamer *Derbyshire*, built by Messrs. Harland & Wolff, Limited, and owned by Messrs. Bibby Bros. & Co., Liverpool, proceeded down the Belfast Lough for trial trip and adjustment of compasses. The dimensions of the vessel are:—Length, 452 ft.; beam, 52 ft.; depth, 34 ft. 6 in.; her gross tonnage being 6,636. The propelling power consists of two sets of triple-expansion engines of the most modern type, constructed in the builders' works. This vessel has four masts, schooner-rigged, and is equipped with powerful steam winches, windlass, and patent steering gear, all the newest and best appliances for working ship and cargo, and is also fitted with steam fans for ventilating all the holds, &c., to prevent damage to cargo by heat. While well adapted for cargo purposes, the *Derbyshire* has been arranged to carry a large number of passengers, for whose comfort ample accommodation has been made, the cabins, smoke-rooms, lavatories, &c., being large and mechanically ventilated, and luxuriously furnished and finished with all conveniences, which go to make comfort on a long voyage at sea. The vessel is under the command of Captain Harris, R.N.R., and will shortly proceed on her maiden voyage to Ceylon, Burmah, &c., from Liverpool.

The s.s. *Arcadia*, of the Hamburg-American line, which has practically had the greater part of a new bottom put into her, after being ashore on the American coast, is almost completed, and will leave this port in a few days to again resume her station on the Atlantic. It is somewhat of a curious coincidence that the s.s. *Arabia*, a sister ship, has gone ashore near the same place, and is also badly damaged in bottom, and is also reported to be on her way to this port for repairs.

The s.s. *Torr Head*, of this port, which recently underwent a most extensive overhaul to her bottom in the dock here, which she just vacated shortly before the *Arcadia* went in, has again had a similar mishap, and is again on her way here to get repaired. Still another lame duck has just arrived: the s.s. *Elswick*, of West Hartlepool, a vessel of 4,000 tons, while proceeding down channel the other day struck the Maidens, and most seriously damaged her bows, and has been towed to this port and dry docked for repairs.

Messrs. Workman, Clark & Co., Limited, whose engineers are locked out, are not making much progress, as their whole extensive establishment is almost at a standstill, their yards and engine works being kept open only by a limited number of men and apprentices.

Trade here in shipbuilding and engineering would be at its brightest only for this unfortunate lock-out, there being plenty of work all round. If rumours be true any amount of both orders and enquiries for large tonnage are reported to be plentiful, but in the unsettled state of labour at the present time nothing can be done to bring business to a definite issue. There are at the present time three new steamers for local owners building on the lower reaches of the Clyde, being for carrying coals, and will form an important addition to the tonnage of the port. Shipbuilders, please note that Belfast can spare some of these small orders to her not so fortunate neighbours.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—No change of any moment can be noted in the shipbuilding trade of this district during the current month. The demand for new tonnage has not improved, nor have builders shown any inclination to negotiate for new orders in view of the uncertainty as to when they can deliver, owing to the continuance of the dispute with the engineers. There is the further fact that new orders which would have been probably placed at Barrow have gone elsewhere owing to the industrial war that is raging. This is a very unfortunate state of things, especially happening just at a time when Messrs. Vickers, Son & Maxim

have acquired the Barrow yard and are anxious to put new life and enterprise into the business. It is certain, however, that as soon as all is settled and the men are again at work, there will be an important industrial revival in Barrow, and to that end arrangements are now making steady progress. The demand for warship tonnage is still maintained, and in addition to the large and important orders held at Barrow by Messrs. Vickers for the British Admiralty, other important work is likely to be placed here by other Powers. The proposal to lay down ships built of their own steel, manned by their own guns, protected by their own armour-plates, and fully equipped for sea from their own absolute resources, will enable Messrs. Vickers, Son & Maxim to quote for the delivery of complete warships ready for immediate action if need be on leaving the port of Barrow. It is known that Messrs. Vickers have already secured the confidence of more than one Power for whom they are going to build ships, and it is certain when the proper time comes they will lay down some modern types of warships, and thoroughly equip them in every way so as to show the world what they can do. With this view arrangements are making rapid progress at the new gun-testing ground at Eskmeals, on the Cumberland coast. Here proper conveniences for the testing of guns is to be made together with the provision of offices, entertaining rooms, &c., for the use of experts who are likely to frequent the place. The guns after leaving the Sheffield works will be tested here, and then taken to Barrow and fixed on the ships for which they are to be specially built. No new orders have been booked by the Barrow Co. during the month, and it is feared that at least one big warship has gone out of the country, which Barrow had a good chance of securing the order for, owing to the difficulty the company has in fixing up dates of delivery. In Admiralty work tenders are being prepared for one or two of the new belted cruisers required by the Admiralty. Much progress has been made with the *Niobe*, first-class cruiser, which now has all her boilers in, and her four smoke stacks fixed. Work here, however, has had to be suspended because of the engineers' dispute, and now the ship is completely at a standstill. On the *Amphitrite*, a sister ship, much activity has been evident for some time, but this has received a check in consequence of the "black squad" having proceeded as far as they can with some of their work until the engineers come in to pick up their share. The pity of it all is that the men are very anxious to return to work, but they cannot do so in face of the firmness of their leaders to fight on to the bitter end, and a bitter end it will be for the men, and probably still more bitter for the leaders. No satisfactory progress has been made with the trial trips of the torpedo-boats destroyers built at Barrow. The *Avon* and the *Otter* have been out on trial on the Clyde, and the former has returned to Barrow with a damaged shaft. The other two torpedo-boats built at Barrow, the *Bittern* and the *Leopard*, are being prepared for preliminary trials. It is probable that the *Duke of Cornwall*, the high-speed, twin-screw Channel steamer, for the Barrow and Belfast service, will be launched before Christmas, as she is wanted on her station in the early spring of next year. The three other commercial steamers building at Barrow, the two Clan Liners, and the telegraph cable-laying steamer, are making progress in construction. There is room in the yard for at least a dozen more ships than are in course of construction at present, and it is unofficially whispered that soon after the engineering dispute is settled work will congregate there to an extent even unprecedented in the best period of Barrow's shipbuilding history. A new limited company has been registered at Barrow, with which the Messrs. Vickers are connected, for the treatment of wood for shipbuilding purposes, with the object of making the wood non-flammable. It is proposed for this purpose to acquire land in the neighbourhood of the shipbuilding yard. Extensions have been arranged for at the office of Messrs. Vickers, Sons & Co., at Barrow, so as to provide additional accommodation for Admiralty and other overseers, model-room, &c. This is anticipatory of a bigger trade concentrating itself at the Barrow shipyard at an early date.

West Cumberland.—There is much steadiness to note in the shipbuilding trade of West Cumberland, although very few new features are worthy of notice. At Workington and at Maryport business is fairly plentiful, and is likely to remain so, as there is a constant and regular demand for the small class of tonnage constructed here, and even if the demand failed the work would go on, as the market would arise before the craft were built. The want of the district is a small engineering firm adjacent to the West Cumberland yards, so that ships might be engined before they left the district. Probably this want will be supplied some day before long.

Sale of Works.—It is reported on good authority that Mr. J. A. Hope, of Carlisle, has purchased the West Cumberland Iron and Steel Works which have stood idle for so long. The smelting furnaces, as well as the steel plant, are of the old type, and would want total renovation before they could be economically utilised in the trade of to-day. Attention for some time has been devoted to the question of making ship-plates and sections in West Cumberland, as the conditions there favour economic and commercial production, as carriage by sea to shipbuilding centres is naturally low in cost.

Shipbuilding Material.—There is a fairly good demand for steel shipbuilding material, but local producers are not too well off for orders, as a short time ago, as reported in the MARINE ENGINEER, they contemplated closing down the mills owing to an alleged inability to keep them employed at the current run of quotations. Circular notices to this effect were sent out to their customers, but influences have been at work to induce local makers to keep their mills going, not only in the interests of the town of Barrow generally, but in view of the help this particular trade is to the shipbuilding industry of the town. Large specifications were immediately poured into the hands of local makers when they sent out notices of a projected stoppage, and they have made the works very busy. Orders, however, are not now largely held, but makers having changed their programme and being determined to keep their mills going if possible, are now anxious for new work. The demand for plates in the meantime, however, is not active, although it is certain to be so in the near future. Prospects are in fact very good so far as the future is concerned, and it is only a question of keeping the mills going for a few weeks until the engineers' difficulty is settled to assure a steady and continuous run of business for some time to come on heavy as well as light plates. Indeed, it is certain that the need of putting down a more comprehensive plant for the production of steel shipbuilding material will be demonstrated as well on local as on general account. It is felt to be an unfortunate fact that the order for the steel material required in the construction of the two Clan Line steamers building at Barrow for Messrs. Cayzer, Irvine & Co. has had to go out of the town, but as the order has gone to a merchant, it is quite on the card yet that the steel will be made in Barrow after all. This is regarded as desirable from the point of view that Mr. Cayzer is M.P. for the borough and likes to the support town with any orders he can give out.

Hematites.—The hematite pig-iron trade has been very steadily employed during the month, and new business has been done to a fairly liberal extent. Makers are well employed with 39 of their furnaces in blast, as compared with 36 in the corresponding month of last year. Prices are steady at an average of 48s. to 50s. 6d. per ton net f.o.b., for mixed Bessemer nos. net, f.o.b., while warrant iron is at 47s. 9d. net cash sellers, 47s. 8½d. buyers. The stocks of warrant iron have now been reduced 106,981 tons since the beginning of January, and stand at 188,965 tons. The prospects of the trade are very satisfactory.

Shipping.—The shipping trade is fairly well employed, and the aggregate exports exceed those of last year, although while showing a very large increase in exports of pig-iron, they show a decrease in steel shipments. Up to the end of October, the exports of pig-iron from West Coast ports reached 348,468 tons, and those of steel 364,699 tons, as compared with 258,705 tons of pig-iron and 396,755 tons of steel in the corresponding period of last year, showing an increase of 89,763 tons of pig-iron and a decrease of 32,056 tons of steel.

Institute of Marine Engineers.—The ninth annual Conversazione of this Institute will be held in the Town Hall, Stratford, on Friday, December 3rd, 1897. The President, J. Fortescue Flannery, Esq., M.P., J.P., M.I.C.E., will deliver his address; organ recitals and a miscellaneous entertainment will be given, and a ball will be held from 9 p.m. till about 3 a.m.

The Reeves Patent Filters Co., Limited.—We are informed that the new Board of Directors of this firm consist of Sir William Corry, Bart., shipowner, 9 and 11, Fenchurch Avenue, E.C.; Mathew Murray, Esq., of Palmerston Buildings, E.C., and at Lloyd's; and J. George Acoles, Esq., of the Holford Engineering Works, Perry Barr, Birmingham.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Ayrshire.—On August 27th an iron steam ketch of about 135 tons, named the *Ayrshire*, was launched at North Shields for the North Lincolnshire S.S. Co., Limited, Grimsby.

Dauntless.—On August 28th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, an iron keel of the following dimensions, viz.:—Length, over all, 72 ft.; beam, moulded, 18 ft. 6 in.; depth amidships, 9 ft. 3 in., and with a carrying capacity of 220 tons. The vessel was built to the order of Mr. W. Ford, of Hull, and was christened *Dauntless* by Miss Ford, daughter of the owner.

Douglas.—On September 15th Messrs. Cook, Welton & Gemmel launched at Hull, for the Hull Steam Fishing and Ice Co., Limited, the iron steam trawler *Douglas*, a vessel of 150 tons gross.

Arnvoth Castle and **Lawrenny Castle.**—On September 27th Messrs. Edwards Bros. launched at Shields, for the Castle Steam Trawling Co., two iron steam trawlers, named the *Arnvoth Castle* and the *Lawrenny Castle*, each 142 tons.

Almerian.—On Monday afternoon, September 27th, there was launched from the Southwick Yard of Messrs. Robert Thompson & Sons, a finely modelled first-class cargo steamer for Messrs. F. Leyland & Co., Limited, Liverpool. Length between perpendiculars, 351 ft. 6 in.; breadth, 42 ft. 3 in.; and depth, moulded, 26 ft. Built to Lloyd's 100 A1 three-deck rules, with poop, long bridge and topgallant forecastle, having cellular bottom and peaks for water ballast; the tanks are divided longitudinally for trimming purposes, the holds being divided by seven watertight bulkheads, with six powerful steam winches for working the cargo from the five holds and extra-strong double derricks to each hold. The steam steering engine is placed aft inside the poop with control shafting under beams to wheelhouse on bridge. The vessel has been specially designed to carry a large cargo on a light draught, with extra strength to keel for lying aground. The accommodation for captain and officers is on the bridge deck forward, the engineers' berths being at after end, and crew are provided for in forecastle. The engines are by Messrs. Geo. Clark, Limited, cylinders being 22 in., 36 in., and 62 in. by 48 in. stroke, with extra-large boilers. During construction the machinery has been superintended by Mr. Neville Evans, and the hull by Captains Pry and Trant. As the vessel left the ways she was gracefully christened *Almerian* by Miss Olive Thompson.

Tannenfels.—On Monday, September 27th, Messrs. Wigham Richardson & Co. launched, from their Neptune shipyard, a large steel screw steamer which they are constructing to the order of the Deutsche Dampfschifffahrts Gesellschaft "Hansa" of Bremen. The vessel is built of steel, and is intended to take the highest class in Lloyd's Register. She is 432 ft. in length by 54 ft. beam, and will be rigged as a schooner. The engines are of the four-crank quadruple-expansion type 210 lbs. working pressure, balanced on the well-known Yarrow, Schlick and Tweedy system, and they, with the boilers, are also being constructed by Wigham Richardson & Co. The vessel will also be supplied with a very complete installation of auxiliary machinery both for working the cargo and the ship herself, including eight steam winches, two steam cranes, steam windlass, steam steering gear, &c. As the vessel left the ways she was named the *Tannenfels*, the christening ceremony being gracefully performed by Mrs. Dudgeon.

Assyrian.—On Monday, September 27th, Messrs. Furness, Withy & Co., Limited, launched from their Middleton Dockyard, Hartlepool, a large steel screw steamer of handsome design to the order of Messrs. F. Leyland & Co., Limited, Liverpool. She is a fine type of a modern cargo boat, measuring over 360 ft. in length, and built throughout of Siemen's-Martin steel with large measurement and a deadweight carrying capacity of about 4,600 tons, built to Lloyd's 100 A1 class to their three-deck rule. All deck erections, skylights, bulwarks, &c., are constructed of steel and iron; cellular double bottom fitted fore-and-aft for water ballast, the after peak being also available. The greater portion of the plates are in 24 ft. lengths, making the structure of the ship very strong. Six powerful steam winches, one multitubular donkey boiler; patent steam steering gear and screw gear aft; patent direct steam windlass, stockless anchors hauling into hawse pipes, and all modern appliances are fitted for the handy working of the ship. The saloon and cabin providing accommodation for the captain is handsomely finished in polished hardwood. The vessel will be rigged as a two-masted fore-and-aft schooner, and will be fitted with triple-expansion engines, having cylinders 22 in., 36 in., 62 in. by 48 in. stroke by Messrs. Thomas Richardson & Sons, Limited, Hartlepool. The vessel and machinery have been constructed under the superintendence of Mr. Neville Evans and Captain Fry on behalf of the owners. On leaving the ways the ceremony of christening her *Assyrian* was gracefully performed by Mrs. Henry Withy, Brantford House, West Hartlepool.

Orkney.—On September 28th Messrs. Thomas Scott & Co. launched at Goole the steam fleeter *Orkney*, a vessel of 150 tons gross, owned by the Hull Steam Fishing and Ice Co., Limited.

Tunstall.—On September 29th Messrs. R. Craggs & Sons launched at Middlesbrough-on-Tees, to the order of Messrs. Furness, Withy & Co., Limited, of West Hartlepool, a steel screw steamer of the following dimensions:—Length, between perpendiculars, 271 ft.; breadth, 40 ft. 6 in.; depth, moulded, 18 ft. 9 in. She will be fitted with triple-expansion engines by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, having cylinders 20 in., 32½ in., and 53 in., by 36 in. stroke, with two single-ended steel boilers. The vessel is being constructed under the superintendence of Mr. Arthur W. Walker, of West Hartlepool. Before leaving the ways the vessel was named the *Tunstall*.

Dove.—On September 29th Messrs. Edwards Bros. launched at Shields the iron screw trawler *Dove*, of 144 tons, owned by the Kelsall Bros. Co., Limited.

Admiral and **Bangkok.**—On September 29th Messrs. Cochrane & Cooper launched from their yard at Grovehill, Beverley, two steam trawlers, which they had built to the order of the East Coast Steam Trawling Co., Hull. The vessels are 112 ft. long by 21 ft. broad, by 11 ft. 6 in. depth of hold, and will be fitted with triple-expansion engines by Messrs. Bailey & Leetham, Hull. The first vessel was christened *Admiral* by Mrs. Cochrane, and Mrs. R. Blades named the other *Bangkok*.

Fridtjof Nansen.—On September 30th Messrs. John Readhead & Sons launched at South Shields a new screw steamer, built to the order of Messrs. Bergh & Holland, Bergen. The vessel, which is 338 ft. in length, 47 ft. broad, and 26 ft. 4½ in. depth, moulded, is of the improved single-deck type, classed 100 A1 at Lloyd's under special survey, and strengthened forward for steaming through ice. She has cellular double bottom fore and aft for water ballast and is fitted with all modern improvements for rapid loading and discharging of cargo. The steamer will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, having cylinders 24 in., 40 in., and 64 in., with 42 in. stroke, steam being supplied by two large steam boilers, working at a pressure of 160 lbs. per square inch. As the vessel left the ways she was named *Fridtjof Nansen* by Miss Clemetson, of North Shields.

Rhona.—On September 30th Messrs. Rennoldson & Sons launched at South Shields the steel towing vessel *Rhona*, of 180 tons. She is to class 100 A1, and is owned by Messrs. Mason & Barry.

Sand Pump Dredger.—On September 30th there was launched from Messrs. Walker's yard, at Sudbrook, a sand pump dredger which is being built by them to the order of the Wallasey Urban District Council, under the superintendence of Messrs. Flannery & Tritton, consulting engineers, of London and Liverpool. The dimensions of the dredger are 160 ft. by 27 ft. by 11 ft. 4 in., and she is constructed to carry over 600 tons of spoil on a draught of about 10 ft. The hopper doors, of which there are 12, are raised and lowered by steam winches of special construction, and there is spacious accommodation forward for the crew. The propelling engines, which have been built by Messrs. Plenty & Son, of Newbury, are of triple-expansion type and take steam from a large single-ended boiler, working at 160 lbs., and the engine-room is complete with special auxiliary feed pumps, Webster's combined feed heater, and filter, and other modern fittings. The dredging apparatus is by the well-known firm of Messrs. J. & H. Gwynne, of Hammersmith, and consists of a 15-in. compound centrifugal pumping engine specially designed for dredging purposes, and to resist the cutting action of sand. The 15-in. iron suction piping is so arranged that it can be swivelled entirely inboard and housed

by means of a steam lifting and derricking crane when the vessel is entering dock or proceeding to sea, while a special mouthpiece is arranged to deal with both sand and marl which is found at Egremont and New Brighton. The plant is complete with auxiliary and circulating and hydraulic pumps, and is of the very latest design. There were present at the launch, Mr. R. R. Green, chairman of the Wallasey Council; Mr. Richard Geogh, chairman of the Ferry Committee; Mr. Ellery, a member of the Ferry Committee; Mr. F. Ashe, ferry manager; Mr. Mr. S. B. Tritton, of Messrs. Flannery & Tritton. After the launch the vessel was taken to Cardiff to receive her machinery.

Croydon.—On Thursday afternoon, October 7th, this vessel was successfully launched by Messrs. Jos. L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and is built to the order of Messrs. Houlder, Middleton & Co., London. This is the third vessel built by this firm for these owners. She is built to Lloyd's highest class under their special survey, and is specially constructed to meet the requirements of the Eastern trade. Her principal dimensions are:—Length, 358 ft.; breadth, 48 ft.; depth, moulded, 28 ft. 4 in., and is designed to have a deadweight carrying capacity of over 6,000 tons and a large cubic measurement. She is built on Lloyd's three-deck rules, with a partial main deck. A large poop is fitted aft, containing the accommodation for Lascar firemen, with galley, washhouse, etc., the remainder of the space being suitable for cargo or stores, A long bridge is fitted amidships suitable for the carrying of cargo, and on top of this bridge are placed large houses for the accommodation of the engineers, officers, captain, steward, saloon, and a limited number of spare berths, with the usual pantries, store-rooms, etc. On top of the saloon house is placed a steering and chart room, with sleeping accommodation for the captain, and above this house is placed a controlling gear connected by rods to the steam steering gear, which is placed in the after end of the casings. The vessel is divided by six watertight bulkheads, and is built on the cellular double-bottom system, arranged for water ballast which is also fitted in the after peak tank. She is built on the web frame and longitudinal intercostal system. The forecastle is arranged for the accommodation of Lascar seamen, with galley, washhouse, etc., also separate accommodation for the petty officers, paint and oil rooms, etc. A patent steam windlass is placed on the forecastle head. The cargo hatches are worked by seven powerful steam winches supplied with steam by a separate boiler. A powerful screw steering gear is placed on the poop deck aft. The cargo hatches are worked by double derricks and every arrangement has been made for the rapid handling of cargoes. The vessel is rigged as a two-masted fore-and-aft schooner, and is generally a good specimen of the modern cargo vessel. The engines and boilers are constructed by Messrs. Blair & Co., Limited, of Stockton, the sizes of the cylinders being 25 in., 42 in., 68 in. by 45 in. stroke; 160 lbs. pressure. The owners were represented by Mr. Bunclark and Captain W. Butler, under whose superintendence the vessel has been built. There was a numerous company present at the launch, including Mrs. Bunclark, who gracefully christened the vessel and launched her by hydraulic power, Mrs. Pherson, Miss Florence Kemp, of Dartford; the representatives of the builders, etc. After the launch the company adjourned to the firm's luncheon room, where the usual toasts were duly honoured.

Chantenay.—On October 9th Messrs. Short Brothers launched from their shipbuilding-yard at Pallion, Sunderland, a handsomely-modelled steel screw steamer built to the order of the Societe Generale de Houilles and Agglomares of Paris. The vessel is constructed of steel to the highest class in Lloyd's register, under special survey, and is of the following dimensions:—Length, 255 ft.; breadth, 36 ft. 9 in.; and depth, moulded, 19 ft. 6 in., with a deadweight carrying capacity of about 2,600 tons on a comparatively light draught. The vessel has been specially constructed to meet the requirements of the trade in which she will be engaged. The hatchways are very large and self-trimming, with four steam winches placed on raised platforms for working cargo. The vessel is constructed on the cellular double bottom principle for water ballast, divided into trimming tanks. The holds are four in number, divided by watertight bulkheads. Accommodation is provided in the poop for the captain and officers, the engineers being berthed in the bridge-house, and the crew in the topgallant-forecastle. The vessel is fitted with steam steering gear amidships and screw gear aft, steam windlass and large donkey boiler, and all modern arrangements and improvements for despatch in loading and discharging. The engines, which are triple-expansion, will be fitted by Messrs. W. Allan & Co., Sunderland, having cylinders 19 in., 31 in., and 51 in., with a stroke of 36 in., with large steel boilers working at 160 lbs pressure. On leaving the ways the vessel was named the *Chautenay*, the ceremony being performed by Miss Dora T. Short, of Sea View, Sunderland.

Crest.—On October 13th there was launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., at Bill Quay-on-Tyne, a handsome steel screw steamer, which has been built to the order of Messrs. Dent & Co., of Newcastle-on-Tyne. The principal dimensions of the vessel are as follows, viz.:—Length, 332 ft.; beam, 46 ft.; and depth, moulded, 23 ft. 9 in. The vessel is a very fine specimen of the modern cargo steamer, and is of the improved single-deck type, with poop, long bridge, and topgallant forecastle. Shs is rigged as a fore-and-aft schooner, with fidded topmasts, and is fitted with all the latest improvements and appliances for facilitating the rapid loading and discharging of cargo and the general working of the vessel. The saloon, captain's accommodation, and spare berths, are in a large house on bridge deck amidships; chart room on flying bridge above; the officers' accommodation being in side houses, also on the bridge deck; while the crew are berthed in the topgallant forecastle. Water ballast is provided in the cellular double bottom, all fore and aft. The vessel has been built to Lloyd's highest class, 100 A1, and has also been inspected during construction by Mr. W. J. Baxter, of Newcastle, the owners' surveyor. She will carry 4,700 tons on 20 ft. mean draught. Her engines are to be fitted by Messrs. Blair & Co., Limited, of Stockton-on-Tees, and will be of the triple-expansion type, having cylinders 23 in., 37½ in., and 61½ in. diameter respectively, with a stroke of 39 in., steam being supplied by two large steel boilers, having a working pressure of 160 lbs. per square inch. There was a large number of ladies and gentlemen present to witness the launch, the christening ceremony being performed by Miss Gillean Strickland, of Newcastle, who named the steamer *Crest*.

LAUNCHES.—Scotch.

Halifax.—On September 16th Messrs. Mackie & Thomson launched at Govan, for Messrs Hagerup, Doughty & Co., Grimsby, the steel steam trawler *Halifax*, a vessel of 165 tons.

Labuan.—On September 22nd Messrs. Russell & Co. launched at Port-Glasgow a steel screw steamer, built to the order of Messrs. G. M. Steeves & Co, Liverpool, to carry 5,800 tons deadweight. She is of the following dimensions:—Length, 340 ft.; breadth, 46 ft.; and depth, 28 ft. 6 in. The vessel is named *Labuan*, and will be supplied with triple-expansion engines by Messrs. Blackwood & Gordon, Port-Glasgow.

Downshire.—On September 22nd the Ailsa Shipbuilding Co. launched for the East Downshire Steamship Co., Limited, a steel screw steamer of the following dimensions:—Length, between perpendiculars, 155 ft. breadth, moulded, 24 ft.; depth, moulded, 11 ft. 6 in. She is to be fitted with a set of compound engines, having cylinders 20 in. and 40 in. by 30 in. stroke, by Messrs. Muir & Houston, Limited, Glasgow. She has been built to the highest class at Lloyd's, and of extra strength, has Board of Trade passenger certificate, and is fitted for the Irish cattle trade; has all modern steam appliances for loading and discharging and for general coasting trade, and was built under the superintendence of Mr. Joseph Lewis, of Belfast. She was gracefully christened the *Downshire* by Mrs. Henesey Dundrum, wife of Mr. E. G. Henesey, manager of the company.

Rothsay Bay. — On September 27th was launched at Anstruther a wood steam ketch of about 100 tons, named the *Rothsay Bay*, owned by the Bay Steam Fishing Co., Kirkcaldy.

Balgay.—On September 29th there was launched from Panmure shipyard (Dundee Shipbuilders' Co., Limited), a steel screw steamer for the coasting trade, built to the order of Messrs. William Kinnear & Co., shipowners, Dundee. Her dimensions are:—Length, 130 ft. 3 in.; breadth, 22 ft. 6 in.; depth, moulded, 10 ft. 3 in.; gross tonnage, 300 tons. The vessel has been named the *Balgay*.

Thasos.—On September 29th Messrs. Fleming & Ferguson launched at Paisley the steel towing vessel *Thasos*, of 130 tons

gross. She is to class 100 A1, and is owned by the Egyptian Government.

Amazonas.—At high-water on October 7th there was launched from the shipbuilding yard of Messrs. Murdoch & Murray, Port-Glasgow, a steel twin-screw steamer of the following dimensions:—Length, 140 ft.; breadth, 28 ft.; depth, 15 ft. 3 in. This steamer is built for trading on the Amazon river with cargo and passengers, and has all the latest improvements for a vessel of her class, including an installation of electric light. The arrangement of the vessel differs materially from any of the previous vessels built by the firm. As the steamer left the ways she was named *Amazonas* and was towed to Glasgow where two sets of compound surface-condensing engines will be supplied by Messrs. Lees, Anderson & Co.

Clarence.—On October 11th the Grangemouth Dockyard Co. launched at Grangemouth a steel screw steamer, designed to carry 1,550 tons on 14 ft. She will be engined by Messrs. Sir Christopher Furness, Westgarth & Co., Limited. The vessel was named the *Clarence* by Mrs. F. le Boulanger, of Swansea, wife of the managing owner.

Humber.—On October 13th the Grangemouth Dockyard Co. launched from their shipyard at Grangemouth a steel screw steamer. The vessel has been built to the order of the Humber Coasting Co., Limited, Hull, for their coasting trade, and is designed to carry 350 tons. The machinery is being supplied by Messrs. Walker, Henderson & Co., Glasgow. On leaving the ways she was named *Humber* by Miss Rita Miller, daughter of Mr. William Miller, shipbuilder, Grangemouth.

Macina.—On October 25th Messrs. U. Napier & Sons, Limited, launched from their shipbuilding yard, Govan, a steel screw steamer of about 1,450 tons, which they have built to the order of Messrs. Devès & G. Chaumet, Bordeaux, for their passenger and cargo service to the West Coast of Africa and up the Senegal River to the French Soudan. The general dimensions are:—Length, 255 ft.; breadth, 36 ft.; depth to awning deck, 22 ft. 3 in., with a topgallant forecastle bridge and deckhouse aft, constructed under special survey to the highest class in Bureau Veritas, with cellular double bottom for water ballast, and fitted with the most modern appliances for the comfort of the passengers and rapid handling of cargo. The machinery consists of a set of triple expansion engines with two steel boilers, and supplied with the most recent improvements for efficiency and economy. As the vessel moved down the ways she was named *Macina* by Mrs. James Hamilton, and after a successful launch was towed up the harbour to receive her machinery, which has been constructed at the builders' Lancefield Engine Works. The party adjourned to the model room, and the toast of "Success to the ship and prosperity to the owners" was cordially proposed and responded to. Amongst those present were Mr. C. Verrier, of Bordeaux, the owners' consulting engineer; and Mr. George G. Weiss, of Liverpool, their representative in this country.

LAUNCH.—IRISH.

Cymric.—On October 12th a new steamship, the *Cymric*, for the Liverpool and New York service of the White Star Line, was successfully launched from the yard of Messrs. Harland & Wolff, the celebrated builders of Queen's Island, Belfast. This vessel, whose gross tonnage is 12,300 tons, and displacement 23,000 tons, is the thirty-sixth vessel constructed by the same builders for the White Star Line, and by far the largest cargo-carrying steamer in the world. Her dimensions are as follows:—Length, 600 ft.; breadth, 64 ft.; depth, 42 ft. The *Cymric* will have twin propellers, driven by separate sets of quadruple-expansion engines of Messrs. Harland & Wolff's design, with boilers working up to 200 lbs. pressure. In their successful conveyance of live stock the steamers of the White Star Line have gained an excellent reputation, and it is intended that besides her large cargo and dead meat capacity the *Cymric* shall be fitted to carry 830 head of cattle on the upper and middle decks, also with permanent stalls of the latest kind for a large number of horses on the upper deck. With the addition of the *Cymric* the White Star Atlantic fleet alone will include eight new steamships of the highest class, all propelled by twin-screws, an element of security in ocean transit which cannot fail to obtain the favourable recognition of passengers, shippers, and underwriters.

LAUNCH—GERMAN.

Off-Shore Dock.—On September 28th the Flensburg Shipbuilding Co. launched the first half of a new floating dock built for Copenhagen. The dock is constructed by Messrs. Clarke & Standfield, London, as one-sided off-shore dock.

TRIAL TRIPS.

Alexandra.—The s.s. *Alexandra*, which was launched by Messrs. Alexander Stephen & Sons, Linthouse, on August 3rd, and was pretty fully described at the time, went down the river on Monday, October 4th, for adjustment of compasses, &c., and made her official trial trip on Tuesday, October 5th. She is the first vessel built for the recently formed Wilsons & Furness-Leyland Line, Limited, of London, for their trade between London and New York and Boston. She is classed 100 A1, three-deck rule, in Lloyd's, but in many respects is in excess of their requirements. She has passenger accommodation, of the most handsome and elegant character, for 130 first-class passengers, and is fitted to carry about 640 head of cattle, which, by her special design, are absolutely and completely separated from the passenger accommodation. Her deadweight carrying capacity is about 8,000 tons. The party on board included, among many others, Mr. Walter Glynn, one of the directors of the owners' company; Mr. Martin, of the Leyland Line; Mr. C. H. W. Wilson, of Hull; Mr. Neville Evans, and Captain Trant, who have superintended the construction of the vessel; Captain Manley, the marine superintendent of the new line; Captain Marshall, who is to command the *Alexandra*; Mr. Redman, Captain Jacobsen, &c.; while the builders' firm were represented by Mr. John Stephen, Mr. Alexander E. Stephen, and Mr. Fred. J. Stephen. The weather was very unfavourable, but in every other respect the trial trip was most successful. The smoothness with which the machinery worked was much remarked, and the speed attained was highly satisfactory. After dinner Mr. John Stephen proposed success to the ship and her owners. Mr. Glynn responded, and in very cordial and congratulatory terms, proposed the health of the builders, Mr. Alexander E. Stephen acknowledging the compliment. Among other toasts were "The Superintendents," proposed by Mr. Fred. J. Stephen, acknowledged by Mr. Evans and Captain Trant; "The Captain, officers, and crew," proposed by Mr. John Stephen, and replied to by Captain Marshall; and "The Ladies," proposed by Mr. Martin, and responded to by Mr. Wilson.

Itauri.—On September 18th the new passenger steamer *Itauri*, built by the Flensburg Shipbuilding Co., for the Kosmos Line, of Hamburg, made a very successful trial trip. The dimensions of this boat are 383 ft. by 46 ft. by 30 ft. 8 in., and triple-expansion engines of 2,000 H.P. Average speed 12½ knots.

Alba.—On September 20th a successful trial trip took place of the steamer *Alba*, which has been built by Messrs. Edwards Brothers at Howdon-on-Tyne, and engined by Messrs. Baird & Barnsley, of North Shields. This vessel has been constructed specially for the coasting and continental trade, and is 139 ft. long, with a beam of 23 ft. by 11 ft. The main engines are of the triple-expansion type. The vessel steamed over the measured mile several times, and a mean speed of nine knots per hour was obtained. The *Alba* is a sister vessel to the *Varda*, and was built to the order of Mr. W. H. Wise, of Hartlepool.

Queenswood.—On September 22nd the steamship *Queenswood*, built by Messrs. Ropner & Son, of Stockton-on-Tees, made her official trial trip, when a speed of about 11½ knots was obtained in a run as far as Sunderland and back to the Tees Bay, everything connected with the engines and ship proving satisfactory. This steamer is of about 4,100 tons deadweight, and is fitted with the builders' patent "trunk," the machinery being supplied by Messrs. Blair & Co., Limited. The steamer has been built to the order of Messrs. Constantine, Pickering & Co., Middlesbrough, under the supervision of Mr. William Constantine, who was present at the trial trip, together with the owners, who expressed themselves highly pleased with the results obtained.

Fides.—On September 22nd the steam trawler *Fides*, built by Messrs. A. Hall & Co., Aberdeen, to the order of the Anglo-Norwegian Steam Fishing Co., Hull, went on her trial trip. The vessel is one of the largest trawlers ever constructed at the port of Aberdeen. When the vessel got out into the bay her

head was turned northwards, and the measured mile was run. Her machinery worked smoothly, and a most satisfactory speed was attained.

Alert.—On September 24th the trial trip took place on the Mersey of the steam launch *Alert*, built by Messrs. Thomas Downie & Co., Toxteth Engine and Shipbuilding Works, Caryl Street, for the firm of Messrs. Wills & Co., Limited. The little craft is 54 ft. long, and has a very smart and capable appearance. She is the first steamer built and engined by Messrs. Thomas Downie & Co., and certainly does the firm credit. She is built of wood, and is copper sheathed. Her engines are of the compound surface-condensing type, running most smoothly on the trial, and giving every satisfaction both to the builders and the owners, who were represented on board by Mr. Stanley Jones. The engines are fitted with special pumps, designed by Mr. T. Downie, which acted quite up to expectation. She is provided with one of M'Kechnie's patent propellers. The *Alert* is meant for service at Gibraltar, and is most suitable for tending ships, doing light towage, carrying stores, &c. She made several runs on the river, which were of a most satisfactory nature, exceeding her contract speed of nine miles. The vessel was designed by the builders' manager, Mr. D. Blair, and the consulting engineers were Messrs. Harvey and Bower. A party of gentlemen went the run, and were delighted with the capabilities of the launch. A luncheon was served in the cabin, to which the following gentlemen sat down:—Messrs. T. W. Lichtenberg, Thomas Downie, Stanley Jones, R. F. Harvey, J. R. Smith (Harvey & Bower), W. L. Bennett (Port Said), E. Bousfield, J. West, J. J. Mahon, E. A. Davies, D. Blair, W. M. Gracie, and J. M. Dumbell. After a pleasant trip the party were landed at the Prince's Stage.

Trawler Prince.—On September 28th the steel trawler *Trawler Prince*, constructed to the order of Mr. W. H. Storey, North Shields, by Messrs. J. T. Eltringham & Co., and engined by Mr. G. T. Grey, South Shields, the machinery being 45 N.H.P., had a successful trial trip off the Northumberland coast, when an average speed of 10 knots was attained.

Craigneuk.—On October 1st the screw steamer *Craigneuk*, of about 5,000 tons, built by the Blyth Shipbuilding Co., Limited, of Blyth, for Messrs. Russell, Huskie & Co., of Leith, was taken to sea for the official trials of speed, &c. The *Craigneuk*, loaded with coal at Blyth, proceeded to sea early in the morning under the command of Captain McKenzie, and a large party consisting of the owners, builders, and guests were taken off to her by tug later in the day. With ideal weather the sea trip was highly enjoyed by all present, and the splendid manner in which the vessel acquitted herself on the different trials of speed and other various manœuvres through which she was put, was in the most complete manner satisfactory to both owners and builders. The engines, which have been built by Messrs. Blair & Co., of Stockton, gave the usual good results which that firm are noted for. The completion of the hull and engines has been under the personal supervision of Mr. D. Huskie, one of the owners of the vessel. After the luncheon on board, the *Craigneuk* proceeded on her voyage to Alexandria with the best wishes of the numerous company, who returned to Blyth by tug.

Batavier II.—On October 5th the steel screw steamer *Batavier II.*, the first of two which Messrs. Gourlay Brothers, of Dundee, have built for the Nederlandsche Stoomboot Maatschappij, of Rotterdam, ran her trial trip. The vessel, which had on board a company of gentlemen, proceeded down the river as far as the Buoy of Tay, where compasses were adjusted, and afterwards steamed out to sea. Everything on board was found in good order, and the working of the engines gave satisfaction. The measured mile between Arbroath and Auchmithie was covered at the rate of 13¼ knots per hour.

Kassala.—On October 5th the screw steamer *Kassala*, built and engined by the London and Glasgow Engineering and Iron Shipbuilding Co., Limited, for Messrs. Maclay & M'Intyre, Glasgow, proceeded down the Firth on her trial cruise. The *Kassala*, which is a vessel of 3,825 tons gross, is 370 ft. by 48 ft. by 27 ft. 6 in., moulded. She has been built for a general carrying trade, and is designed to carry 6,200 tons deadweight on a comparatively small draught. She is classed 100 A1 at Lloyd's. Accommodation for the steamer's officers and engineers has been placed immediately below the bridge deck, and all the rooms are comfortably furnished. In the construction of the steamer most care has of course been applied to her carrying capacity, and she has been designed to have the largest deck area possible for carrying cattle and timber. Her engines are on the triple-expansion principle, her cylinders being 23½ in., 39 in., and 64 in., by 45 in. stroke. Two boilers are fitted, each having three furnaces, and the working pressure is given as 180 lbs. The furnaces are fitted with Messrs. Howden & Co.'s forced draught and direct driven fan and engines. The engines worked smoothly throughout, and certainly reflected credit on the builders, who in the present engineering dispute have had to rely solely on their apprentices for their fitting work. It may be added that the speed between the lights averaged 11·7 knots, 10½ knots being the speed required at sea.

Citta di Palermo.—On October 7th this vessel, which was recently launched by Messrs. Short Brothers, Sunderland, for Messrs. Pierce, Becker & Ilardi, of Messina, left the builders' yard at Sunderland, and proceeded to sea on trial trip. After adjusting compasses she was run over the measured mile with satisfactory results, the average speed obtained being 13 knots. The vessel has been built to the highest class in Lloyd's Register, and is of the following dimensions, viz.:—Length, 320 ft.; breadth, 44 ft.; and depth, 26 ft. 8 in. She has been supplied with engines by Messrs. George Clark, Limited, with cylinders of 24 in., 40 in., and 66 in., by 45 in. stroke, with two large boilers of 180 lbs. working pressure, fitted with forced draught. The vessel has two complete iron decks, with lofty space between, full poop, topgallant forecastle, and bridge deck 100 ft. long and 8 ft. high, the intermediate spaces being filled in with a shade deck of pine. She has seven watertight iron bulkheads and cellular bottom fore-and-aft for water ballast; also five holds of about equal capacity, worked by large steam winches and double derricks. The vessel has been built to a high-class specification, and the cabins fitted up in very handsome style in solid oak, which, together with the engineers' and officers' accommodation, is fitted on top of the bridge, leaving the underneath entirely free for cargo or cattle. The *Citta di Palermo* afterwards proceeded direct to Galveston in command of Captain Queirolo.

Whitehall.—On Thursday, October 7th, the s.s. *Whitehall*, built by Messrs. Craig, Taylor & Co., of the Thornaby Shipbuilding Yard, Thornaby, for Messrs. Guthe & Co., West Hartlepool, proceeded to sea on her trial trip from the Tees to the Tyne, which proved highly satisfactory, a speed of about 11½ knots being obtained. The dimensions of the vessel are, 280 ft. by 41 ft. by 18 ft. 9 in., and she will carry about 3,100 tons on a light draught of water. The engines have been constructed by Messrs. Sir Christopher Furness, Westgarth & Co., Limited, Middlesbro', the size of the cylinders being 20 in., 32½ in., 53 in., by 36 in. stroke, two boilers working at 160 lbs. pressure. The owners of the vessel were represented by Mr. Robert Craig, who has had the superintendence of the finishing of the boat.

Derbyshire.—On October 8th the new steamer *Derbyshire*, built by Messrs. Harland & Wolff, left Belfast Harbour and proceeded down the lough for trial trip and adjustment of compasses. The *Derbyshire* has been built to the order of Messrs. Bibby Bros. & Co., of Liverpool, and is intended to trade in their service to Ceylon, Southern India, and Burmah. The dimensions of the ship are:—452 ft. long, by 52 ft. beam, by 34 ft. 6 in. deep, the gross tonnage being 6,636 tons; the propelling power consists of two sets of triple-expansion engines of the most modern type, constructed in the builders' works. The vessel has four masts, and, while well adapted for cargo purposes, she has been arranged to carry a large number of passengers, for whose comfort ample provision has been made, including mechanical ventilation of the state-rooms, baths, refrigerators to ensure an ample supply of ice and fresh provisions, and electric light throughout the ship. The saloon, which is large and commodious, is amidships, and the ladies' room and library, situated on the boat deck, are most luxuriously fitted. The first-class smoking-room is on the same deck, immediately aft of the engine-room. The state-rooms are on both the main and hurricane decks, and are all large and roomy, and elaborately furnished.

Kirklee.—On October 9th the s.s. *Kirklee*, which has been built by Messrs. Bartram & Sons, of Sunderland, for Messrs. J. R. Cuthbertson & Co., of Glasgow, was taken to sea for a trial trip. She is of the spar-deck type, with poop, bridge, and forecastle, and has been built under special survey for Lloyds' 100A class, and under the superintendence of Mr. J. M'Ewan, of Greenock, on behalf of the owners. The dimensions are:—Length, 344 ft.; breadth, 45 ft.; depth, 28 ft. 9 in.; gross

tonnage, 3,580 tons, with extra large measurement capacity. There are four large holds free from all obstructions, and especially suitable for large general cargoes. The hatchways are large, and each have a powerful steam winch. The steam steering gear is placed in the engine-room and worked by shafting from the flying bridge. The donkey boiler is of the horizontal multitubular type, and has been made by Riley Bros., of Stockton. The engines have cylinders 24½ in., 40 in., 66 in., with a stroke of 45 in., and have been made by Messrs. John Dickinson & Co., Limited, and are fitted with the latest improvements for safe and economical working, including Weir's evaporator, Weir's feed pumps, steam ash hoist, Kirkaldy's feed filter, &c. The boilers are made for a working pressure of 180 lbs., and are fitted with Howden's system of forced draught. All the machinery has been made under the superintendence of Mr. M'Kechnie, of Glasgow, and during the trial trip it worked with great smoothness, and gave universal satisfaction. The vessel attained a speed of 11 knots on the measured mile, and after a run along the Northumberland coast proceeded on her first voyage.

Monarch.—On Tuesday morning, October 12th, the mammoth steamer *Monarch*, built by C. S. Swan & Hunter, Limited, Wallsend, left her moorings at the builders' yard and was taken to sea to undergo her trials. Like her sister ship, the *Milwaukee*, she may be deemed to be one of the most perfectly complete cargo steamers ever built. Her dimensions are 484 ft. over all, 470 ft. perpendiculars, 56 ft. beam, and 42 ft. 3 in. depth to the shelter deck. She has a carrying capacity of 11,700 tons dead-weight, or a measurement capacity of upwards of 18,000 tons, and is fitted for the conveyance of a large number of cattle in the 'tween decks, with cattle stalls of the latest type and most approved arrangement of water service; whilst for rapidly handling the very large cargoes which the steamer will carry an exceptional number of powerful winches, together with derrick post and derricks, have been placed in convenient positions about the decks. It not being intended to carry passengers, the accommodation, which will be placed on the shade deck, is of a very limited, although very comfortable description; water-ballast will be carried in the double bottom throughout the vessel and also in a deep midship tank, the total quantity amounting to about 3,000 tons; fresh water can also be carried in some of these tanks for the use of cattle, fresh water condensers, which can work at all hours, will also keep up the necessary supply of fresh water. A complete installation of electric light throughout has been fitted by Messrs. W. H. Allen & Co. John Campbell & Son's self-adjusting accommodation ladders are also fitted for ascending to the high deck. The propelling machinery has been constructed and supplied by the Wallsend Slipway and Engineering Co., of Wallsend, and consists of an exceptionally massive set of engines having cylinders 28½ in., 46½ in. and 80 in. diameter respectively by 54 in. stroke; the steam is supplied at 180 lbs. pressure by three large boilers fitted with Howden's system of forced draught, and in order to still further economise fuel and increase speed the propeller is fitted with the Manganese Bronze Co.'s blades. In addition to Lloyd's classification and extra scantlings beyond their requirements, the steamer has been constructed under the supervision of the Board of Trade and to the requirements of the German law, so as to adapt her for any trade and to enable her to be taken up at any time as a passenger steamer. During her construction the *Monarch* has been under the special survey of Captain Evans on behalf of the owners, whilst the machinery has been under the superintendence of Mr. C. Lees and also Mr. Alexander Taylor on behalf of the builders. The *Monarch* whilst lying at the builders' yard took on board 1,600 tons of bunker coal, and having her ballast tanks filled, proceeded to sea at an early hour in the morning, where the compasses were adjusted, the guests arriving by tug from Shields at 10.30, proceeded at once to the steamer at sea, after which a series of runs on the measured mile were taken. Amongst the guests on board were Mr. Alfred L. Jones, the head of the firm of Messrs. Elder, Dempster & Co.; Mr. H. J. Ward, Captain Evans, Mr. C. S. Swan, and Mr. C. Stephenson, of Messrs. C. S. Swan & Hunter, Limited; Mr. W. Boyd and Mr. Laing representing the engine builders, The Wallsend Slipway and Engineering Co., Limited. After the departure of the guests the *Monarch* proceeded on her way to New Orleans in charge of Captain Lugg.

Navarro.—On October 13th the steamer *Navarro*, belonging to Messrs. John Glynn & Son, was taken down the river on her official trial trip after having had her machinery converted by Messrs. David Rollo & Sons, of Fulton Engine Works, Liverpool, to triple-expansion, with a pressure of 200 lbs. per square inch, in two large boilers, worked under forced draught. Considerable repairs and alterations to the hull have also been effected. On the trial everything worked in a highly satisfactory manner. The alterations have been carried out to the specification and under the supervision of Messrs. George Hepburn & Son, assisted by Captain Telleria and Mr. G. Barclay, the company's overlookers. The *Navarro* is one of La Randera Espanola line of Spanish mail steamers, hence to the Island of Cuba (of which line Messrs. Hawkes, Somerville & Co., 22, Water Street, are the general agents). She is commanded by Captain Goicoechea.

Tai-Nan.—On Thursday, October 14th, the s.s. *Tai-Nan*, built by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands shipbuilding yard, Sunderland, to the order of the Osaka Shosen Kabushiki Kaisha, Osaka, Japan, for their Formosa trade, was taken on her official trial trip. After the adjustment of compasses the ship was run north on the Hartley measured mile course, and afterwards on the long run from Tynemouth Lighthouse to Hartlepool, the result of the trial being that the vessel attained a speed of over 16½ knots, which was considered to be highly satisfactory by the company's representatives who were on board. There was an ample supply of steam and the engines worked very smoothly throughout, without any heating of the bearings. The vessel is designed on very fine lines, and will attain a speed of over 14½ knots in service; she has been built on the spar deck rules to Lloyd's highest class under their special survey, and has a poop, long bridge, and topgallant forecastle. The passenger and other accommodation is of a very high-class description, and will compare favourably with the best type of vessel built on the North-East coast. She is neatly rigged as a two-masted fore-and-aft schooner, the fore mast being provided with a yard for signalling purposes. The principal dimensions of the vessel are:—Length, 330 ft.; breadth, extreme, 43 ft.; depth, moulded, 28 ft. 3 in; the registered tonnages are:—Gross 3,192; net 1,540, and the deadweight capacity about 3,300 tons on about 23 ft. draught, with Lloyd's summer freeboard. The vessel is subdivided with five watertight bulkheads, and is built on the cellular double-bottom principle arranged for water ballast, which is also fitted in the fore-and-after peak tanks. The poop aft is fitted for the accommodation of part of the officers, engineers, and stewards, and the cook's, doctor's surgery, lamp and store-rooms, and berths for ten second-class passengers, with the usual bath-room and other accommodation. A long bridge right fore and aft is wholly fitted for the accommodation of first-class passengers, second-class passengers, and with accommodation for a number of the chief officers, the second-class saloon, pantries, bath-rooms, etc., there is in this space accommodation for 28 first-class passengers, the berths having two beds in each, and for 40 second-class passengers; the second-class saloon being fitted at the after end of the bridge; in the centre is a large Japanese galley with rice boilers, and also a large European galley. The first-class saloon, entrance hall, social hall, and principal pantry is fitted in a large house on top of the bridge. On the top of this is fitted another house with accommodation for the captain, and the chart-room, and over the top of this house is fitted the flying bridge. The first-class smoke-room is fitted on top of the bridge at the after end. The dining saloon is arranged to seat the whole of the first-class passengers at one time, and is a large, handsome apartment, being lighted by a specially designed and most elaborate skylight, and with square windows right round the house. The main staircase is lighted by a trunk dome skylight, which has a very taking and effective appearance. The accommodation for the seamen and firemen is placed forward in the topgallant forecastle, accommodation is also found here for the usual petty officers, a native galley, firemen's washhouse, sanitary accommodation for the emigrants, etc. The emigrants' accommodation for about 300 is fitted in the forward 'tween decks, with emigrants' pantry, storerooms, etc. The 'tween deck is pierced right fore and aft with sidelights, and lights are also fitted in the hatch covers, &c. The deck machinery consists of five powerful steam winches, and the cargo will be lifted by steel derricks; the steam patent windlass is fitted on the forecastle head and the steam steering gear is placed at the after end of the engine casing with controlling gear to the wheel on the forward bridge, and a powerful screw gear is placed on top of the poop. Six lifeboats are fitted on the bridge amidships, two of them being steel, and two cutters are fitted on the poop deck. Steam is supplied to the deck machinery by a large donkey boiler placed in the

lower hold. A large refrigerating chamber is fitted in the after 'tween decks, for the cold storage of provisions, etc., and is fitted with machinery by the Linde British Refrigerating Co., Limited, of London. The vessel is lighted throughout, including the signal lamps, etc., with a complete installation of electric lighting made by the Sunderland Forge and Engineering Co., Limited, of Pallion, Sunderland, who also supplied a complete arrangement of electric bells. The whole of the accommodation is heated by steam, the berths and saloons having ornamental heating chambers. The weather and promenade decks are all teak throughout, and the whole of the first-class accommodation has been fitted with specially selected hardwood fittings, the designing and ornamentation being most effective. The whole of the upholstery work is of a high-class character, and the general effect is one of extreme comfort and luxury. The beds in the berths are all of iron and fitted with spring bottoms. Special attention has been paid to the fitting and finishing of the vessel throughout, and the whole of the arrangements have been under the direct personal supervision of Mr. S. Konishi, the company's chief superintendent. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited, of Palmers Hill Engine Works, Sunderland, the sizes of the cylinders being 28½ in., 47½ in., 79 in. by 48 in stroke, supplied with steam by four extra large boilers, built to stand 180 lbs. pressure; the machinery has also been built under the superintendence of Mr. Konishi, who has had with him a staff of Japanese experts. The trial was attended by Mr. S. Konishi, Captain M. Uchida and Commander U. Fukuda, of the Japanese Imperial Navy; Mr. M. Kojima, Mr. S. Terano and Mr. T. Atsumi, of the Osaka Co.; Captain S. Tomioka (Toyokisen Kabushiki Kaisha); Captain H. Nagata, of the Osaka Co.; Captain Whale, who is in command; also Mr. Charles E. Thompson, Mr. James Marr and Mr. P. Phorson, on behalf of the builders; Mr. F. J. Dickinson, Mr. J. C. Dickinson, Mr. A. Dickinson and Mr. J. Bowden, on behalf of the engine builders, and a number of other gentlemen. The results were considered very satisfactory, and during the course of the day luncheon was served and the usual toasts were duly honoured. The vessel proceeded to Middlesbro' prior to her departure for the East.

Van der Lijn.—On Friday, October 22nd, the *Van der Lijn*, which has been built by Messrs. Wigham Richardson & Co., to the order of the Koninklijke Paketvaart Maatschappij of Amsterdam, went for a very successful trial trip off the mouth of the Tyne. The steamer has been built for the mail and passenger service in the East Indies, and is very carefully designed and fitted up for the comfort of both the first and second class passengers in the Tropics. She is 220 ft. in length by 31 ft. beam by 18 ft. deep. She is rigged as a two masted schooner, and is classed in the register of the Bureau Veritas. The engines and boilers have also been constructed by Messrs. Wigham Richardson & Co., the former being on the triple expansion principle, and on the trial trip they worked most satisfactorily, driving the vessel at a speed of over 10½ knots. The owners were represented on the trial trip by Mr. Van Hasselt, managing director of the company, Mr. J. de Bruyn Kops, naval architect of The Hague; and Mr. A. C. Metzelaar, superintendent engineer of the company.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

SCREW PROPELLER SHAFTS.

To the Editor of The Marine Engineer.

Sir,—The increasing numbers of fractured screw propeller shafts has lately attracted the attention of steamship owners, underwriters, and others, and the urgency of the question was manifested recently by the report of the investigation into the causes of the accidents, called for by the British Committee of the Bureau Veritas, carried out by Mr. Gravell, their surveyor, and published.

The report appears to treat the matter solely from the landsman's point of view and to overlook the seamen's side of it. It mentions "vibrations in the after part of the vessel" as one of the causes to which the breakage of shafts is attributed, no doubt with good reason, for as we are all aware, vibration tends to crystallize iron and steel, and thereby to increase its liability to fracture.

Ocean travellers in screw steamers know that steaming against high seas brings about violent racing and vibration, even in properly laden vessels, but it is not generally known how tremendously those effects are increased and damaging tremour intensified, under like conditions, in light draught vessels, empty except for their bunker coals and water ballast. "Bending stresses, due to yielding of the vessel," and "hammering produced by sea acting on the propeller" are also set down among the causes of fracture; these causes come into play with greatest force when vessels are pitching and racing in the way described; both are direct results of it, and both tend to increase vibration. In these times water-ballasted steamers are sent on long trans-oceanic passages and generally speaking, their propellers are barely half immersed although they are trimmed by the stern—what happens may be imagined, but only those who have experienced it can realise the behaviour of these vessels, or how utterly unmanageable, dangerous and uncomfortable they become in bad weather; moreover, the undue strains put upon their hulls by such heavy pitching and lurching, bend and break stanchions, shear rivets, and do other material damage to their structure.

The modern system of water-ballasting was never intended to be used in the manner it is, but the excessive risks may be avoided by adding a sufficient quantity of other ballast, a precaution necessary to ensure seaworthiness, adopted with good effect in some cases.

The principal object of this letter is to suggest more frequent resort to the additional ballast plan, and to ask for the recommendation of it by the Press, by Ships' Registry Corporations, by Lloyd's, and by other Underwriters.

Your obedient servant,

London, E.C., October 23rd, 1897. Experience.

Miscellaneous.

Catalogue.—We have received the 1897 catalogue of the American Ship Windlass Co., of Providence, Rhode Island, a company which has achieved considerable reputation in its career of forty years. It lists a number of specialities. These include capstans and windlasses suitable for vessels of every class, size, and employment, including such special designs as those for tugs and yachts, as well as capstans for dock purposes. Pumps and winches for marine use will also be found here, together with such accessories as bitts, stoppers, and deck pipes. Certain matters somewhat outside the scope of the firm's title are included. Amongst these we might instance an ingenious "Barring engine." The name is, we think, entirely American, though forms of the appliance are usually fitted to important vessels built on this side of the Atlantic. The purpose of the barring engine is to turn over the main engines when they have stopped on a dead centre, or where the main engines are not under steam and yet require to be moved in port for repairs or other purposes. The type here put forward is singularly compact and well designed. An ingenious device for oiling worm wheels may also be noted, as well as a rudder supporter, which runs on ball bearings. Testimonials and lists of customers show that most of the important vessels and yards on the other side are customers of this firm. The catalogue is got up in the best American style, well and clearly illustrated with full descriptions of the various goods, and of their special points. Directions too, are appended for the fitting of them and for finding the proper position in the vessel in which to place them, so that time is economised and the best result obtained, even if special workmen are not available. Useful tables as to the proper equipment in the matter of anchors, cables, and windlasses of steam and sailing vessels of all sizes are appended, and information is also given as to the proof tests they undergo. A good deal of attention is devoted to turning gear, and the Herman-Winter patent method of towage is explained and elucidated. This is only to be expected when we remember how much more attention has been given to the towage of sea-going barges on the American lakes, and along the eastern sea board

than in our own coastal waters. Still, certain firms are now making trial of the business here, and attention may usefully be directed to these hints, which are the fruit of much experiment and practical experience. The whole volume is interesting and useful, and there is much of the best American practice in regard to these most important details in vessel's outfits.

Sir Thomas Richardson, M.P.—On Tuesday afternoon, October 19th, in the Council Chamber, Hartlepool, the freedom of the Borough of Hartlepool was conferred upon Alderman Sir Thomas Richardson, M.P. This rare compliment was in honour of the knighthood which was conferred on the borough member by the present Government, and in recognition of the many and eminent services he has rendered to the borough. The corporation also presented Sir Thomas with an illuminated address.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from August 7th to October 5th, 1897.

17919 J. E. L. Ogden. Steam traps.
17929 E. L. Berthon. Fittings of collapsible boats.
17944 J. Kippax. Steam boilers.
17970 J. R. Wigham. Propelling boats by electricity.
17974 S. C. Gearing. Rotary steam condensers.
17994 E. V. and M. Hunter. Buoys.
17999 P. E. Ripley. Governors.
18009 T. G. Stevens. Rudder gear.
18057 J. B. Tripp. Wrenches.
18070 W. Jordan (The Hogan Boiler Co., United States). Boilers.
18076 J. H. Debus. Pistons.
18080 D. R. Smith. Reciprocating propeller.
18088 W. Brock and E. R. Mumford. Screw propellers.
18091 W. Oliver. Saving life from drowning.
18093 O. Podleyxbj. Rotary engine.
18097 W. Rhodes. Ammunition hoists for ships.
18100 J. Gill. Rotary motive-power engines.
18190 R. Runeberg. Joining screw-propeller blades.
18192 R. Runeberg. Navigating vessels.
18194 H. C. Ashlin. Furnaces for steam boilers.
18213 W. M. Smith. Steam generators.
18215 Asa Lees & Co., Ltd., and T. Bosworth. Hopper feeders.
18223 E. R. Farnsworth. Valves for steam.
18230 S. Pitt (Societe Sautter Harle and Compagnie, France). Rudders.
18239 J. Epton. Fishing Nets for trawling purposes.
18245 G. Cooper and The Leeds Forge Co., Ltd. Boilers.
18248 P. M. Justice (The Long Arm System Co., United States). Bulkhead doors.
18270 J. Ball. Towing warps for deep sea fishing.
18281 M. R. Lisboa. Torpedoes.
18283 S. Buckingham. Otter trawl nets.
18293 D. B. Morison. Draining steam vessels.
18307 T. B. Sharp. Manufacture of metallic tubes.
18317 W. F. & J. W. Hutchison. Boiler tube beaders.
18340 A. Racic. Life-belts.
18374 A. L. Larsen. Submarine vessels.
18441 J. Marshall. Centrifugal turbine screw propeller.
18445 S. H. Hollands. Screw propellers.
18460 M. J. Kelly. Composition for preventing corrosion in boilers.
18511 H. B. Daglish and T. Windus. Governing steam engines
18535 W. E. Wadsley, jun. Screw propellers.
18541 P. B. and D. Cow and J. Crump. Funnels.
18546 T. Tomlinson. Internal combustion engine.
18618 V. H. Ernst. Furnaces for steam generators.
18622 C. W. A. Taylor. Securing ship's hatches.
18634 J. B. Archer and J. H. Blackburn. Screw propeller.
18647 A. Reynolds. Reversible marine propeller.
18729 G. Biebuyck. Ships' boats.
18786 D. Allport and A. P. Cary. Pressure gauge.
18817 F. Edwards. Pumps.
18898 C. Dobson. Neck ring and metallic packing.
18959 C. de Vries. Propelling vessels.
18982 W. Ripper. Registering mean pressures of steam.
18984 H. Rippon. Clasp for trawl fishing gear.
19000 W. J. Smith. Speed records for ships.
19008 A. G. Mumford. Steam generators.
19104 G. Beesley. Steam boiler furnaces.
19112 E. L. Kitchingman. Construction of ships.
19133 H. Simcock. Furnace fittings for boilers.
19186 G. P. Mitchener. Steering of vessels.
19187 R. Jones. Valves.
19190 W. H. Feldon. Boats.
19213 C. F. Kraut. Packing for stuffing boxes.
19217 E. Barnes. Pumps.
19218 G. Y. Iliffe. Seamless steel tubes.
19251 C. C. S. Knap. Water-tube boilers.
19387 H. Smith and J. Dickson. Tubes for boilers.
19404 M. R. Lisboa. Ships' compartment indicator.
19416 C. A. Allison (J. T. N. Angell, United States). Metallic packing.
19495 D. Hoyt, W. F. Oatman, and H. D. Hobson. Anchors.
19577 H. Wilke. Steam generators.
19581 R. Tonge and J. Butterworth. Piston-rod packing.
19594 A. Morrison. Steam generators.
19679 A. M. Krotz. Boilers.
19702 F. Kretz. Water jet appliances for ships.
19766 W. L. Thomas. Propeller shaft tunnels.
19767 L. H. Drake. Propellers.
19810 J. Weir. Feed-heating apparatus for boilers.
19813 A. L. W. Ward, J. L. Sykes, and W. Blamires. Buoy.
19820 E. R. S. Barthel. Hopper mechanism, &c.
19867 J. J. Campbell. Prismatic piston rod.
19910 W. T. Rowden. Internal combustion engines.
19912 W. Cooke. Anchors.
19923 R. W. Smith. Crank axle bearings.
19974 C. W. Raders. Governor for steam engines.
20002 A. J. Boult (A. Henry, France). Construction of ships.
20008 J. K. Sheffy. Pipe wrenches.
20044 T. Andreasen. Ships' lights.
20055 J. S. D. Shanks, J. MacCormac, and R. Kelly, jun. Boilers.
20071 F. Long. Rotary pump cylinders.
20110 C. Long Delivering coal in holes of ships.
20116 C. E. Cail. Internal combustion engines.
20154 J. Hamilton and R. Miller. Weldless tubes.
20195 J. Martlew. Cowls.
20208 J. Whitehouse and W. H. Forester. Cranks.
20213 W. R. Bigsby-Chamberlin. Breakwaters.
20229 W. von Pittler. Lathe tools.
20230 W. von Pittler. Lathe chucks.
20243 F. H. Shaw. Compasses.
20300 L. Myers and F. R. Baker. Compasses.
20306 A. O. Fritzsche. Apparatus for propelling boats.
20370 S. J. Whitfield. Seamless metallic tubes.
20477 F. W. Kerswell. Gauges.
20542 J. R. Browne and G. Barratt. Breakwaters.
20543 P. Wright, S. C. Ward, and C. V. Midowicz. Wave motors.
20568 W. P. Thompson (F. V. Winters, United States). Boilers.
20575 C. G. Evans. Pistons.
20592 A. J. Browne and T. H. Bishop. Induced draught.
20700 N. McConachy and R. Faickney. Locking devices for pistons.
20714 W. Harman. Forced draught for boilers.
20742 J. K. Oldfield. Paddle wheels for steamers.
20749 R. and E. Lanzone. Rotary pump engines.
20757 A. G. H. W. Klagges. Removing scale from boilers.
20761 J. Roots. Internal combustion engines.
20762 F. Schoenberger. Valve gear for engines.
20785 E. A. Logier. Hull for lightships.
20789 R. and J. Oldfield. Ships' lamps.
20805 J. H. Bell and W. Rockliffe. Shipbuilding plates.
20811 D. J. Morgan. Locking fire-bars.
20812 D. J. Morgan. Safety tube stoppers.
20884 R. Crane. Boiler.
20904 W. Deighton. Steam generators.
20905 W. Deighton and The Deighton Flue and Tube Co., Limited. Flanging tubes.
20917 H. A. Wood. Valves.
20956 E. Brook. Furnaces.
20965 J. Wilson Method for propelling ships.
20966 C. Hardy. Boiler covering composition.
21042 B. J. Maloney. Plugging war vessels.
21043 A. B. Collis. Water-tube boiler.

21076 F. Boultbee and L. Jeyes. Steam boilers.
21078 T. McNamee. Utilising rise and fall of tide.
21085 R. Archer. Metallic packings for rods.
21108 F. A. L. Grunow. Propellers for vessels.
21162 T. and F. Oldham. Rings for pistons.
21177 W. Cassap. Construction of steam vessels.
21219 J. Cohrs. Trawl-nets.
21283 P. Haenlein. Apparatus for propelling ships.
21292 J. Cottrell. Boat propelling apparatus.
21301 G. Walker. Exhaust steam condensers.
21390 H. Noar. Vehicles for submarine railway.
21436 J. Patterson and R. Carnaghan. Trawl nets.
21460 E. H. O. R. Ropner, jun. Vessel construction.
21481 W. B. Dick & Co., Limited, and F. Courtois. Lubricators.
21532 Baron R. Walterskirchen. Mantlet for armour-plates
21562 A. D. Barclay. Expansion valve for engines.
21588 W. G. Hay. Internal combustion engines.
21592 F. Neame. Cowl ball bearings.
21603 J. F. Allen. Boilers.
21674 J. Thom. Heating feed-water.
21700 F. W. Schroeder. Construction of ships.
21809 G. W. Hart. Internal combustion engines.
21816 J. Ferris. Means for raising sunken ships.
21871 R. Robinson and F. Hall. Engine pistons.
21891 P. F. Maccullum. Internal combustion engines.
21893 J. T. Stewart. Regulating feed-water of boilers.
21898 R. Hacking and R. H. L. Mott. Compasses.
21904 J. Hussey. Buoy valve.
21918 J. Ball. Otter boards for deep sea fishing.
21922 E. Manby. Cylinders of steam engines.
21932 H. G. Holroyd. Engine packing.
21956 W. Corke. Heating bath water on ships.
21987 S. L. Gregor. Supplying forced draught to furnaces.
22019 H. Higgins. Generating steam.
22039 W. B. Fitch. Ships and boats.
22047 C. J. D'Urban. Device for propelling ships.
22114 G. G. M. Hardingham. (Felten & Guilleaume, Germany.) Flexible metallic tubes.
22169 M. F. M. Mulready. Steam engines.
22207 T. Fennelly & F. W. Dobson. Ships, &c.
22222 J. S. and J. L. White and A. Forster. Boilers.
22249 W. P. Thompson. (W. T. Girling, J. J. Torpey and R. C. Cunningham, United States.) Steam engines.
22276 H. W. Handcock and A. H. Dykes. Boat propulsion.
22294 E. Makin, jun. Automatically feeding water.
22309 H. Sidebottom. Imparting motion to the screw of a vessel.
22336 R. Campion, W. H. Brough and T. W. Butler. Boiler covers.
22352 C. L. Morse. Valve re-seating machines.
22372 A. F. E. Dupont. Water-tube steam boilers.
22511 W. Butterworth. Tubes.
22542 E. O. Seale. Water gauge-glass fittings.
22545 C. H. Ramsten. Construction of lightbuoys.
22562 C. Schneemann. Launching ships' boats.
22563 E. G. Edlund. Slide valves for steam engines.
22604 L. Lloyd and W. H. Simon. Stockless anchor.
22605 T. Child. Reversing the motion of a shaft.
22606 J. H. Rosenthal. Water tube steam generators.
22637 S. Noble and R. T. Brankston. Supporting the armour of turrets.
22643 J. H. Owen. Water-tube boilers.
22645 P. Brotherhood. Triple-cylinder engines.
22646 K. E. O. Peters. Ships' compasses.
22714 The Deep Sea Diving Co., Ltd. Diving dress.
22728 C. S. Snell. Handling submarine cables.
22729 C. S. Snell. Laying submarine cables.
22748 J. Thomas. Water gauge for steam boilers.
22758 P. G. Kretschmar. Propulsion of boats.

BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

August 21st, 1897.

Binns, W..... 2C S'nd'land
Booth, J. ..... 2C N.Shields
Bowen, T. P. .. 2C Cardiff
Brefier, C. W... 2C Liverpool
Brown, J..... 1C London
Burley, T. W... 2C N.Shields
Callow, P. H. C. 1C Liverpool
Chinn, T..... 2C Plymouth
Clark, J. ..... 1C W.H'pool
Clarkson, J..... 1C Glasgow
Cook, R. B..... 2C ,,
Couth, R. J.... 2C Cardiff
Darke, C. H.... 1C S'nd'land
Davis, J. ..... 2C Cardiff
Davison, J..... 2C N.Shields
Eden, E. W. B. 2C W.H'pool
Edgecombe, F.. 2C N.Shields
Ferry, H. J. S.. 1C Glasgow
Gaines, W. .... 2C W.H'pool
Galloway, J. ... 1C Dundee
Geary, G. W... 1C N.Shields
Gilchrist, F. S.. 2C Liverpool
Gow, W. J. .... 1C W.H'pool
Gray, T. ..... 2C Glasgow
Guest, F. M.... 2C London
Hall, T. ..... 2C W.H'pool
Harvey, A. .... 2C Glasgow
Hawkes, W. F.. 2C Liverpool
Hughes, T. .... 2C ,,
Jennis, W. J. E. 2C Glasgow
Jones, J. D..... 1C Liverpool
King, N. McL.. 2C Glasgow
Lewis, W. C. .. 1C London
Lowther, W. H. 2C Hull
Mitchell J. .... 1C N.Shields
Murray, D. .... 1C Glasgow
Newell, L. C. .. 2C ,,
Preston, A. .... 1C London
Pyne, H. J. .... 1C ,,
Robinson, J.... 2C W.H'pool
Severs, J..... 1C ,,
Shillington, W.J. 2C Liverpool
Skinner, W..... 2C Glasgow
Smith, J. ..... 1C ,,
Stalkers, Geo. C. 2C S'ham'ton
Stewart, J. .... 2C Dundee
Sumner, J. .... 2C London
Tapscott, G. E. 2C London
Terney, C..... 2C Liverpool
Thomas, Thos.. 1C Cardiff
Thompson, T... 2C W.H'pool
Thoms, J..... 2C Dundee
Tiplady, A..... 1C S'nd'land
Turner, J. A. .. 2C Cardiff
Wallace, G..... 1C N.Shields
Wallace, W.... 2C Glasgow
Wallett, F. .... 2C S'nd'land
Watson, J. .... 1C Leith
Williams, E. J. 1C Cardiff
Wilson, G. .... 2C Leith
Wilson, I. J. .. 2C Liverpool
Wright, A..... 2C Leith
Wright, F. .... 2C Liverpool
Yates, W. D. B. 2C Hull

August 28th, 1897.

Bunting, W.... 1C Lon'derry
Caizley, L. R... 2C N.Shields
Clementson, J. . 1C Liverpool
Crabbe, W. .... 1C London
Crombie, C. M.. 1C Aberdeen
Davidson, D. L. 1C ,,
Findley, John .. 2C Liverpool
Graham, J. .... 1C London
Grills, C. H.... 2C Lon'derry
Heard, C. F.... 1C Liverpool
Jones, C. ..... 1C Aberdeen
Jones, E. ..... 2C London
Keill, Wm. D... 2C Liverpool
McBain, J. .... 1C London
Nelson, J..... 1C N.Shields
Nicholson, J. H. 1C ,,
Oswald, M. .... 1C Lon'derry
Sanderson, E.A. 1C N.Shields
Smith, J. T.... 1C Aberdeen
Smith, John H. 1C Liverpool
Strain, J. ..... 2C Lon'derry
Walton, J. H.. 1C Liverpool
Warren, F. J. B. 2C London
Watson, J. .... 2C Aberdeen

September 4th, 1897.

Arrowsmith, J. E 1C N.Shields
Bennie, F. S. .. 1C Glasgow
Bertram, R. .. 2C N.Shields
Black, D..... 1C Glasgow
Blyth, T..... 2C ,,
Blythe, W. J. .. 2C N.Shields
Boucher, R..... 1C Glasgow
Brock, J. ..... 2C N.Shields
Buntain, W. S.. 2C Glasgow
Christie, J. T... 2C ,,
Corlett, A. .... 1C Liverpool
Cormack, J.... 2C N.Shields
Creber, J. ..... 2C Glasgow
Deakin, N. .... 1C Liverpool
Edmond, W.... 2C N.Shields
Ferguson, A. Y. 1C London
Gaunt, E..... 2C Liverpool
Gibson, J..... 1C Glasgow
Hall, R. ..... 2C Liverpool
Harvey, W. J.. 1C London
Hening, T. .... 2C Liverpool
Hudson, J. .... 2C N.Shields
Innes, W ..... 2C ,,
Johnson, J. G.. 1C ,,
Keenan, T. .... 2C London
King, A..... 1C Glasgow
Laidlaw, J. .... 2C ,,
Maclean, D..... 1C ,,
Marsh, J..... 2C Cardiff
Masters, H..... 2C N Shields
McDonald, A.A. 2C Liverpool
McLean, J. .... 2C Glasgow
Moore, T. ..... 2C London
Oorschot, W. H. 2C N.Shields
Phillips, F. J... 2C Cardiff
Pritchard, R. I. 1C Liverpool
Richards, J. T.. 2C Cardiff
Ritchie, J..... 2C Glasgow
Roberts, E. W. 1C Cardiff
Seed, F. E. .... 1C London
Sewell, H. J.... 2C N.Shields
Spencer, A. E.. 2C Liverpool
Stark, R. ..... 2C Glasgow
Stout, W..... 2C N.Shields
Strong, J. J.... 1C Cardiff
Sullivan, F.... 2C ,,
Thomas, E. .... 2C N.Shields
Whiteway, A. P. 2C Cardiff
Williams, H. B. 1C ,,
Wilson, J. E.. 1C Liverpool
Winter, T. .... 2C Cardiff
Winship, L. T.. 1C N.Shields

September 11th, 1897.

Boyns, J. S.... 1C London
Brown, J. G. W. 1C ,,
Chapman, E. B. 2C Hull
Collyer, H. B.. 2C London
Deighton, John 2C Liverpool
Eastwood, T. .. 2C Hull
Greig, James .. 2C Liverpool
Hartridge, H. J. 2C London
Hendry, Joseph 1C Liverpool
Johnson, C. H.. 1C ,,
McAfee, Geo. C. 2C ,,
McGavan, James 2C ,,
Morgan, John.. 2C Leith
Neill, William J. 1C Liverpool
Ready, A. T. E. 2C London
Reid, Thomas A. 1C Liverpool
Wadsworth, A.. 1C Hull
Williams, A. W. 2C Liverpool
Wilson, J. E. .. 1C ,,

September 18th, 1897.

Allan, G. ..... 1C Greenock
Anthoney, D. R. 1C Dublin
Black, J. ..... 2C Greenock
Black, M. .... 2C N.Shields
Brown, Wm S. 1C Plymouth

The Marine Engineer.

LONDON, DECEMBER 1, 1897.

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ASTOR, LENOX AND TILDEN FOUNDATIONS

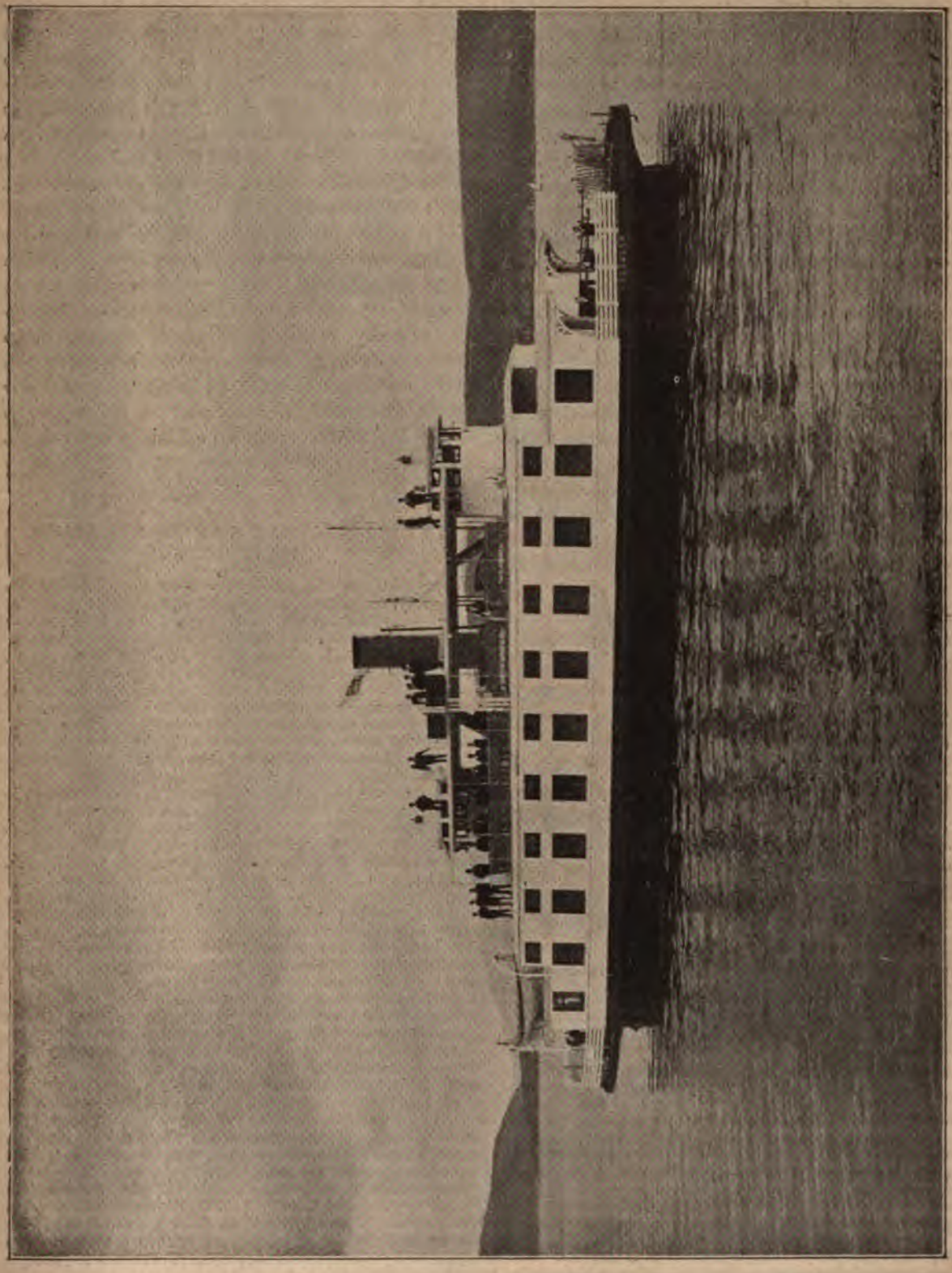
A RECENT decision by Lord Low, in the Scotch Law Courts, between shipowners of Glasgow and Messrs. Russell & Co., shipbuilders, of Port-Glasgow, and which resulted in the favour of the latter firm, has raised points awaited with great interest by both shipowners and shipbuilders, as they have not, to our knowledge, been raised before in any Court of Law. The technical point of great interest involved in the case was the question of certain vessels having been built for the shipowners, with keels cambered to some extent in the building, and which, when measured, when in dry dock, after the vessels had made several voyages, were found to be irregular as to their camber, and varying from 7 in. to 9 in., with evidence of considerable straining and deformation in the hull. The trial, as a legal question, of course turned upon the point as to the responsibility for such an extraordinary condition of camber in the keels, and the consequent responsibility for the expenses to which the owners were eventually put in having all the cambered keels made good to a dead level. With this question of relative responsibility we need scarcely concern ourselves, but record for general information the facts and consequences of the cambering of the keels, which is quite a novel idea in shipbuilding. It would appear from the expert evidence that as some vessels tend to sag in the centre after building, probably through the excessive distribution of weight in the centre of the hull, it would appear that there is a practice in the yards of the Tyne Iron Shipbuilding Co., and of Messrs. Gray & Co., of West Hartlepool, to slightly camber the keels of steamers, as laid, to the extent of an inch or so, to allow the extra weight amidships to settle, and the keel thus to become ultimately perfectly straight. This practice does not appear to exist on the Clyde, or at any rate not to have existed until in the case of the steamers which were the subject of the present trial. The builders admit that they were built with a camber of 4 in. to 4½ in. in the steamers of different size, but aver that this was done under the instructions of the surveyor of the shipowners, and with their consent. Wherever the responsibility may have originated, the result, as an object lesson, serves to prove that such a camber will not tend to drop, and produce a straight keel eventually, but on the contrary, seems to tend to increase. It seems difficult to suppose that this tendency to increase can be caused when afloat, though if the upper decks and the keel are regarded as the upper and lower members of a tubular beam upon which the transverse rigidity of the hull as a whole depends, it would be a most dangerous practice under the ordinary laws of mechanics to divert the rigid keel, which is subject to great compression in its length when the vessel is riding with its centre supported by the crest of a long roller from its direct line of thrust. Any diversion or bowing of a column under direct compression would tend largely to make such bowing increase under strain. An explanation offered as to the possibility of the straining of the hulls, and increase of the sagging of the keels, was that the vessels had been docked upon blocks of extreme camber, in which case the camber of the keel, when afloat, would be exaggerated when in dry dock under such circumstances. It would appear that the difficulty attending the docking of steamers with cambered keels is so great, and the risk of deformation during such docking is so apparent, that this will probably be the last occasion in which any such extreme cambers as that admitted by the builders, viz., 4 in. to 4½ in. in vessels of 6,400 and 7,350 tons deadweight capacity respectively, will be attempted. As we have already stated, the owners, on becoming aware of the difficulties and drawbacks attending such cambered keels, immediately had straight false keels fitted to the vessels at a cost of £40,000, and hence their ground for heavy damages from their point of view against the builders, for what they considered an unlawful, unauthorized, and most injurious device.

ONE of the outcomes of the present lamentable strife between the Amalgamated Society of Engineers and the engineering employers, which we trust will be to the great advantage, both of the trade generally and of those men also who desire to call their souls their own, will be the great expansion in members, and in supporters of the Free Labour Protection Association. Whilst no Briton who loves fair-play would desire to see the workmen deprived of any social advantage obtained by their banding together for mutual support in cases of sickness, want of work, or even vigorous and powerful remonstrance against degrading, dangerous or unfair conditions of labour, yet at the same time the same spirit of fair-play demands that each man or body of men shall have equal right to take their labour to any market that suits them, without intimidation, either open or covert. It is well known that of late years the tendency of the powerful Trades' Unions have been to oblige all members of their trade to implicitly follow the arbitrary decisions of a few leaders, who live by strife and agitation, and to enforce that obedience no means are left unemployed

short of actual riot. Under such circumstances those men, and they are many, who desire to exert their personal independence as to how and when they will work, and to prefer to keep themselves and families in comfort, rather than starve for the support of an idea or claims in which they have no sympathy, require some tangible support and even protection against the too forcible persuasions and abuse of their fellow-workmen. Picketing is the most powerful, and in our opinion, the most unlawful weapon that strikers can use against their fellow-workmen, and though the natural guardians of order are supposed to provide all needful protection, it is obvious that special counter-picketing must be employed for the moral support, as well as protection of those who claim independence of action amongst workmen, until, as we would hope, all picketing and congregating outside works on strike is made illegal. It is to afford such organized moral and actual support and protection to free labour that the Free Labour Protection Association is organized to provide, and at the same time to test and put in action all laws that at present exist for the protection of free labour. It must obviously be of great effect that those who are at present somewhat isolated by their independence of thought in keeping their labour free, and under their own control, should find an equally organized and powerful body to that of their opponents, existing for their support and protection.

As the safety and protection from danger of the engine and boiler-room staff should be the paramount duty of a journal such as the MARINE ENGINEER, we are happy to find that our Editorial Note in our last issue, upon the bursting of the steam-pipe on the *Thrasher*, has induced some of our friends and readers to communicate as to means recommended to minimize, if not entirely remove the danger, at any rate to life, resulting from such a disaster. A Norwegian reader has even pointed out that the Norwegian Government having been approached on the subject by the native Society of Marine Engineers, has gone so far as to issue a Governmental order on the subject, that all new steamships or steamships having new boilers fitted, should absolutely be provided with some approved form of quick-closing valve in addition to the usual screw-down stop-valve. We are not accustomed here to such paternal Government, but we think that the well-known humanity of steamship owners would ensure that for the future some simple appliance, of whatever may prove the most serviceable and reliable kind, should be fitted to all main steam-pipes, to check the disastrous effects of a bursting of such pipes. We shall congratulate ourselves exceedingly, if our efforts in drawing attention to this matter should result hereafter in saving from a most painful injury, or even death, the humblest artificer or stoker of the Naval or Mercantile Marine.

THE question of the relative cost of new ships in France and in England has recently been brought to the front in French shipping and shipbuilding circles through a newspaper correspondence, in which Messrs. Bordes & Son, of Bordeaux and Paris, have taken part, and indications are not wanting that British builders may in the near future benefit from the discussion thus set agoing. The firm of Bordes & Son, it will be remembered, up till between five and six years ago had numerous sailing ships constructed on the Clyde, mostly four-masters of large tonnage. About five years ago Messrs. Bordes & Son, like other French owners, were in a manner compelled to discontinue patronising British builders, and to place all further orders for new ships with builders in their own country. This was brought about by the cancelling of the bounty which had for thirteen years previously been due on all new vessels built abroad, amounting to *half* the total sum allowed to owners as "navigation bounty" on the ships of their fleets built in France. This step was undoubtedly a blow aimed at the ability of British builders to continue a rivalry, in which they had been very successful, even against French builders who received a bounty on every ship they built for home owners of as much as half its total cost. Coupled with this, therefore, little wonder that the abolition of the half navigation bounty had the effect of stopping all French orders for foreign builders forthwith. Curious to state, however, all this expensive nurturing of home shipbuilding has not had the desired effect. Little more than two years sufficed to show French owners that they had been very much better off under the half-bounty system, which enabled them to add to their fleets from British yards. From that time till now an agitation has been going on in France for the restoration of the half navigation bounty. French builders, it is alleged, having now no fear of rivalry, charge most exorbitant prices, and exercise no expedition whatever in construction. It is acknowledged by French shipowners that the navigation bounty allowed on the after management of their ships, enables them to afford some 20 or 25 per cent. more for a new ship built in France than if built in Britain or abroad. They say that if they could obtain all the vessels required at such a price, and have reasonably quick delivery, they would probably never think of agitating for the re-establishment of the half-bounty system for foreign-built vessels.



DOUBLE CREW FERRY STEAMER "CHEBUCTO." (*See page 322.*)

The direct occasion of the recent correspondence above alluded to, in which the Messrs. Bordes have taken part, was the statement in a French financial paper that the continued decline in French shipbuilding was in great part due to the fact that Frenchbuilders "would not undertake to turn out a ship in less than two and a half years, and at double the price demanded in England." This evoked a reply from M. de Cabrol, the director of the Chantiers de la Loire yard at St. Nazaire (where at the present time two new Channel steamers are completing for the Dover and Calais service), who stated that his company had just contracted to build two cargo boats, to be delivered, one in fourteen and the other in sixteen months, and at prices not exceeding 20 per cent. higher than British-built vessels. Messrs. Bordes & Son, referring to the statement by M. de Cabrol, state that during the past four years they have had built in France eleven steel vessels, measuring 33,000 tons, five of which vessels were built by the Chantiers de la Loire Co. The price that had been asked by British builders for each of these vessels was £25,200, whereas the lowest they could get them built for in France was £34,000—a difference of 35 per cent. Last year Messrs. Bordes offered the Chantiers de la Loire Co. an order for two additional ships, but instead of £34,000, the price demanded per ship was £46,000, or 82 per cent. above the British price. Messrs. Bordes were, in these circumstances compelled to abandon the idea of building the ships in France, and to purchase them in this country. The experience of this enterprising firm with the St. Nazaire Co. in finding their price for a given size and class of ship expand—within a period of about three years—from 35 to 82 per cent. higher than the price asked in this country, was probably representative of what obtained in all the shipbuilding yards of France, and little wonder that Messrs. Bordes again resorted to British sources, even although in so doing they forfeited the usual navigation bounty. Probably this action on their part may have had the effect of bringing about those improved conditions under which, as M. de Cabrol declares, contracts are now being undertaken by his company. Whether or not the company may continue to accept contracts at only 20 per cent. above British prices is doubtful, while in the matter of delivery there is certainly still room for great improvement. The undertaking M. de Cabrol boasts about, viz., to build two cargo boats in fourteen and sixteen months respectively, would scarcely be considered a feat on the Clyde, or in other British centres, when in the turning out of such vessels it is only rarely that more than half the periods stated is exceeded. In France, it has been a matter of remark, builders take four months to lay the keel from the date of order being given, whereas in this country about one-fourth of the time suffices. The profits from shipbuilding in France—bounty-fed as the industry is—are not so great as might readily be supposed. In fact, there are few concerns carried on at a profit at all. The protective duties builders have to pay on their raw materials, the snail-pace rate of working, and the bungling and inefficient character of the workmanship, are all causes which have been instanced as at work, eating up much of what is so lavishly forthcoming in the way of building bounties. A year or so of further experience should decide whether French shipbuilders can really meet owners on the lines indicated by Messrs. Bordes—and partially realised, it would appear, by the Chantiers de la Loire Co.—or whether the agitation for the re-establishment of the half-bounty system will become intensified, and succeed in its object, thus placing French owners in a position to order ships in this country as freely as before.

DOUBLE-SCREW FERRY STEAMER "CHEBUCTO."

THE diversified character of the work produced from Clyde shipyards is often exemplified, and a recent and notable instance of this consists in the building, and dispatch across the Atlantic, of the steamer *Chebucto*, a double-screwed ferry boat, for service between Halifax and Dartmouth, Nova Scotia, a distance of about two miles. In her design and construction there are features of considerable novelty, so far as usual practice on this side of the Atlantic is concerned, while, as regards general appearance, she presents an exterior so striking and unusual that in passing down the Clyde she was the subject of curious comment on the part of shipyard and shipping workers, who are certainly no strangers to maritime novelties.

Although the first craft of her special type to be constructed on the Clyde, the *Chebucto* nevertheless represents a type of ferry steamers not uncommon on American rivers and estuaries. Most of the ferry boats for example, on the Hudson and East Rivers between New York and Jersey, and New York and Brooklyn, are of this type, one of the first to be placed on the service being the double-screw boat *Bergin*, which began to ply in 1888. The *Chebucto* is the first ferry boat of this kind to be adopted by the Ferries committee of Dartmouth, N.S., and it is noteworthy that the contract for her construction was placed with the Clyde firm of Messrs. John Shearer & Sons, after competition with firms in Canada and the United States.

The vessel is constructed and equipped for vehicular and passenger traffic, two carriage ways being provided along the middle of the main deck, and saloons for passengers along each side on the sponson wings. Her length over all is 140 ft., and between perpendiculars 123 ft.; extreme width, 50 ft.; moulded width, 33 ft.; and moulded depth, 13 ft. 7 in. The hull is built of steel to Lloyd's highest class, both ends being alike in form, and the lines are yacht-like in fineness. The shell plating above water is swept sharply outwards from about the moulded width of 33 ft. to meet the extreme width of 50 ft. on the deck. What in ordinary vessels would be the sponson wings, supported on diagonal struts, is in this case an integral part of the structure, formed by the outward sweep of the ship's framework and plating. The beams of the main deck, which extends in one length for the extreme breadth of vessel, are of heavy section, and are supported by fore and aft truss girders of channel steel, extending from floor of vessel.

On the wings, or sponsons, are houses extending for 100 ft. of the vessel's length, and 13 ft. high; bridging from side to side

is a hurricane deck, also for passengers' accommodation. The unusual height of deck-houses mentioned is necessitated by the provision for "headroom" along the carriage way for lofty loads. In the high topsides formed by the wing-houses there are two tiers of windows, the upper tier being filled in with cathedral glass, giving a fine effect to the interior of the wing-houses. Here there are handsome curve-back settees, running the whole length of saloon, divided by electro-plated elbow-rests, which afford seating accommodation for 222 passengers.

On the hurricane-deck are two pilot-houses—one at each end—containing the steering gear for each end of vessel. Extending over the hurricane deck and embracing both pilot-houses, which have rounded fronts with large windows, a light awning deck is fitted. Electric light is provided throughout the ship, and the saloons are heated by a thorough system of steam radiators.

What constitutes an outstanding peculiarity of the *Chebucto* is that a screw propeller, as well as a rudder and steering gear is fitted to each end of the vessel, and that both propellers are actuated simultaneously in propelling her. The rudder, at what may be the fore end of the ship for the time being, is held fast in the fore-and-aft position by a simple "locking" arrangement controlled from each pilot-house. The main driving engines—which were supplied by Messrs. McKie & Baxter, Copland Works, Govan, consist of two pairs of compound surface-condensing engines, built upon one bedplate, and with low-pressure receivers separated only by a division plate. The low-pressure cylinders are 24 in. diameter, and the high-pressure 12 in., the length of stroke being 18 in. Steam is supplied at 125 lbs. pressure from two boilers of the Admiralty type, 7 ft. 6 in. diameter by 18 ft. long, each having two corrugated furnaces, 36 in. diameter and 7 ft. 9 in. long. When both engines are working, coupled together, as is the case when the vessel is on her station, she will be propelled by a double four-crank engine, actuating a screw aft and a similar screw forward. The propellers are each 6 ft. 3 in. diameter and 8 ft. 3 in. pitch, having four blades. The engines are reversed by direct-acting steam gear on a new principle, the invention of Mr. Baxter, of the engineering firm, in conjunction with Mr. Donald, of Falmouth. In this gear the necessity for the hydraulic cylinder, which has been so constantly employed in apparatus of this kind, has been dispensed with, and the promptness of action secured is remarkable. In a future issue we propose giving an illustration of this and other special machinery on board, as well as a view of the general arrangement of the engines and boilers.

There are about a dozen auxiliary engine pumps, &c., of various kinds on board, all being independent of the main engines. There is an installation comprising five pumps by the Blake & Knowles Steam Pump Works, Limited, including a duplex independent air-pump having one 6-in. cylinder, driving direct without rotary motion a pair of air cylinders 12-in. diameter by 8-in. stroke. This air-pump, we understand, is the first of its kind that has ever been fitted to a vessel in this country, although they are much in favour in the United States. There are also a special form of feed pump, a donkey pump, a boiler circulating pump, and a sanitary pump—all of the Blake & Knowles' special horizontal duplex type. The air pump discharges into a tank from which the feed pump draws through a filter, the speed of the pump being automatically controlled by a float. The exhaust steam from all the auxiliary engines, including electric light engine and steam windlass (the latter for the Atlantic voyage only) is carried to the condenser, which has a cooling surface of 500 square feet, and the feed-water passes through a heater on its way to the boilers. The centrifugal circulating pump, which has a 5½-in. suction and discharge, and is 20-in. diameter, is one of McKie & Baxter's "Challenge" patterns, and is fitted with a special balanced valve, the invention of Mr. Baxter. The electric generating machinery consists of a four kilo-watts dynamo, fitted on same bed-plate with a 5-in. cylinder engine by Messrs. M. Paul & Co., Dumbarton.

Messrs. Mavor & Coulson, Glasgow, fitted the lighting installation, the wiring being done on their "concentric" system. The installation, which is equivalent to sixty lights of 16-candle power, includes four side-signal lights, two tower lights, and four three-light pendants in each saloon.

On her speed trials on the Clyde, on August 12th, with both engines and propellers working, the power developed was 400 H.P.I., and the mean speed of the two runs over the measured mile reached 10 knots, which for a vessel of her novel construction was considered by experts on board a highly satisfactory performance. The two engines were afterwards disconnected and the vessel propelled by the aft screw only, the forward engine of course remaining stationary. The forward shaft and propeller were allowed to revolve freely, from the thrust block outwards, and these—due entirely to the motion of the vessel through the water—made about 60 revolutions per minute. Propelled under these conditions the *Chebucto* made close upon nine knots, a result which may be thought to justify the query: "Why for an extra knot in speed should the propulsive machinery have been doubled?" It must, however, be remembered that the primary object of the screw at each end working simultaneously, is the ease and promptitude with which stopping and manœuvring can be effected, more than the augmentation of the speed. When only one propeller was working considerable vibration was felt, but there was an entire absence of this when both engines were running coupled together and driving both screws.

The *Chebucto* is the first harbour ferry steamer which has made the attempt to cross the Atlantic, and this, coupled with the other fact of the contract for her having been secured in this country after competition with American and Canadian builders, have caused an extra degree of interest to be evinced in her voyage which, as it turns out, and as far as it has gone, has been somewhat adventurous. Her small draught of slightly over 9-ft., together with the high deckhouse erections, which offer great surface resistance to the elements, have proved, as was anticipated by some, features rendering navigation difficult during an Atlantic voyage, which was from one circumstance and another allowed to impinge too seriously on the autumn and winter.

The *Chebucto*, after having been sheathed and strongly battened over with wood to withstand the blows of the sea, left the Clyde on the 15th August, under the command of Captain Geddie, with picked officers and crew. She experienced heavy weather in the Channel, and when about 260 miles out from the Tuscan she laboured considerably, and it was found advisable to put back to the Clyde. She did so, and was in the hands of her builders for some time for additional staying and strengthening. She left the Clyde again on the 9th September, and on the 29th of that month intelligence was received that she had put back to St. Michael's, the Azores, damaged and leaking. Here, in all likelihood, the *Chebucto* remains until the spring of next year, as any attempt to proceed during the winter would be attended with distinct peril.

THE INSTITUTION OF CIVIL ENGINEERS.

AT the first ordinary meeting of the 79th session, held on Tuesday, November 2nd, the President, Sir John Wolfe Barry, K.C.B., delivered a short address to the members, dealing with various matters concerning the present and future welfare of the Institution.

After expressing his appreciation of the honour conferred by his election a second time to the presidency, and having addressed the Institution at length last year on engineering, past and present, he preferred this year to confine his remarks to matters of a domestic nature affecting the home of the profession and the welfare of the members.

He referred to the increasing duties devolving upon the Council in proportion to the growth and importance of the Institution, now numbering on its roll 7,075 persons. In expressing his thanks to the members of the Council for the cordial support accorded to him as president, he desired that the numerous advisory and other services rendered to the body corporate by its members in all parts of the world should be recognised at large as it was appreciated by the Council and executive, who, fully realised its value in the conduct of affairs.

The President proceeded to refer to the Engineering Conference, held by the Institution in May, the estimated attendance at which was 850. He thought it would be acknowledged that the interest exhibited in the numerous subjects brought forward for discussion, in which upwards of 300 speakers took part, and the fact that 2,000 tickets of admission were applied for in respect of the visits arranged in connection with the gathering, justified the Council in believing that it had given general satisfaction to the members. The division of the conference into seven sections, representing more or less distinct lines of engineering thought and practice, afforded a useful means of meeting the overlapping of ideas and treatment in the various departments of engineering activity embraced by the Institution.

Reviewing the subject of the examinations recently instituted, the President pointed out how they were intended to show that candidates for election into the class of associate members were acquainted with those general principles which had always been and must be recognised as the basis of the engineering profession, and also to make clear that each candidate possessed a somewhat fuller scientific knowledge of the elements of the particular branch in which his special training had lain. Although an advocate of examinations for the purpose of ensuring the possession among those who entered the Institution of proper qualification in respect of theoretical knowledge, the President desired to avoid being understood to claim for such knowledge one whit more than its real worth in the equipment of an engineer. Practical knowledge was no less necessary now than formerly, and in the engineer's office, in the workshop and on works of construction, and there only, could a young engineer learn by experience to modify and correct theoretical conclusions by practical considerations. The examinations had not been instituted in lieu of other qualifications set out in the by-laws, but in addition to and supplementary of them. In the case of persons whose experience and attainments were such as to entitle them to the grade of full member, no question of examination arose under the provisions of the by-laws, and the Council had power to deal with exceptional cases of candidature for associate membership also without examination. The President had every confidence in the future advantage to accrue to the Institution from the step now taken, and whilst at the outset no doubt there might be some special cases in which the Council might wisely exercise the discretionary power vested in them, he believed such cases would gradually diminish in number, and disappear altogether.

After referring to the accommodation for the ordinary work of the Institution afforded by the new premises, the President alluded to the advantage that might be enjoyed in the possession of a great hall for gatherings of a special character, with the adjunct of a museum of engineering materials and models. Whilst, having regard to the expenditure already incurred in rebuilding, the Institution itself might not be justified in entertaining such an idea, he hoped that the Institution might some day possess a hall not inferior to those which had in late years been erected by the munificence of the donors of the Bute, the McEwen, and the Usher Halls at Glasgow and Edinburgh.

THE "DUPLEX" AND "ABSOLUTE" STEAM TRAPS.

IN our issue of June, this year, we gave a description and illustration of a simple and ingenious

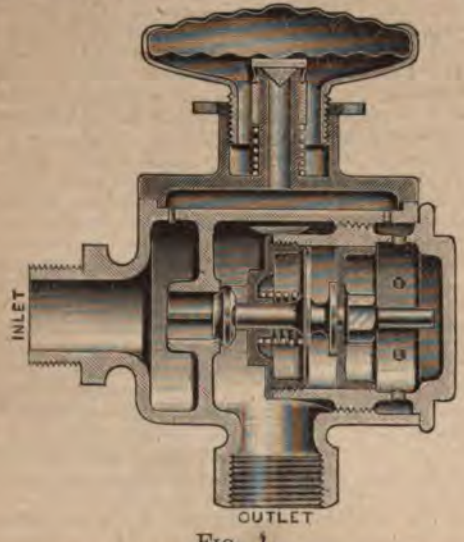


FIG. 1.

device called the "Midget" steam trap. Since then the manufacturers have made further advancements in the matter and are now making two types, each having special features of its own, under the names of the "Duplex" and "Absolute" steam traps respectively.

In Figs. 1 and 2 of the adjoining diagrams we show a vertical sectional elevation and an outside elevation respectively of the "Duplex" trap.

The object of this particular steam trap is to deal with small and large quantities of water as circumstances require. The action of the trap is—as its name implies—double.

At the upper part of the device the flexible condenser containing the volatile fluid is situated, which controls the small flow of condensed steam, by the con-

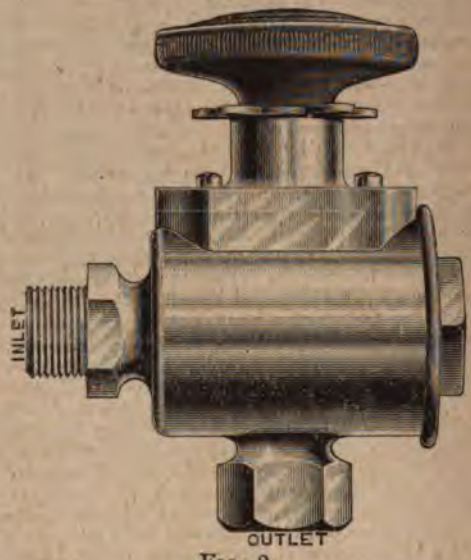


FIG. 2.

traction and expansion of the volatile liquid acting on the diaphragm consequent upon the alternate heating and cooling of the same by the steam and water of condensation respectively. For the large flow a cylinder is arranged in the body of the device, within which works a piston on the rod of which is situated a valve engaging on a valve-seat interposed directly in the passage between the inlet and outlet. On the piston-rod is also another valve which closes the end of the cylinder when the piston is in the extreme left-hand position: this is to stop any steam which may pass the piston in the cylinder.

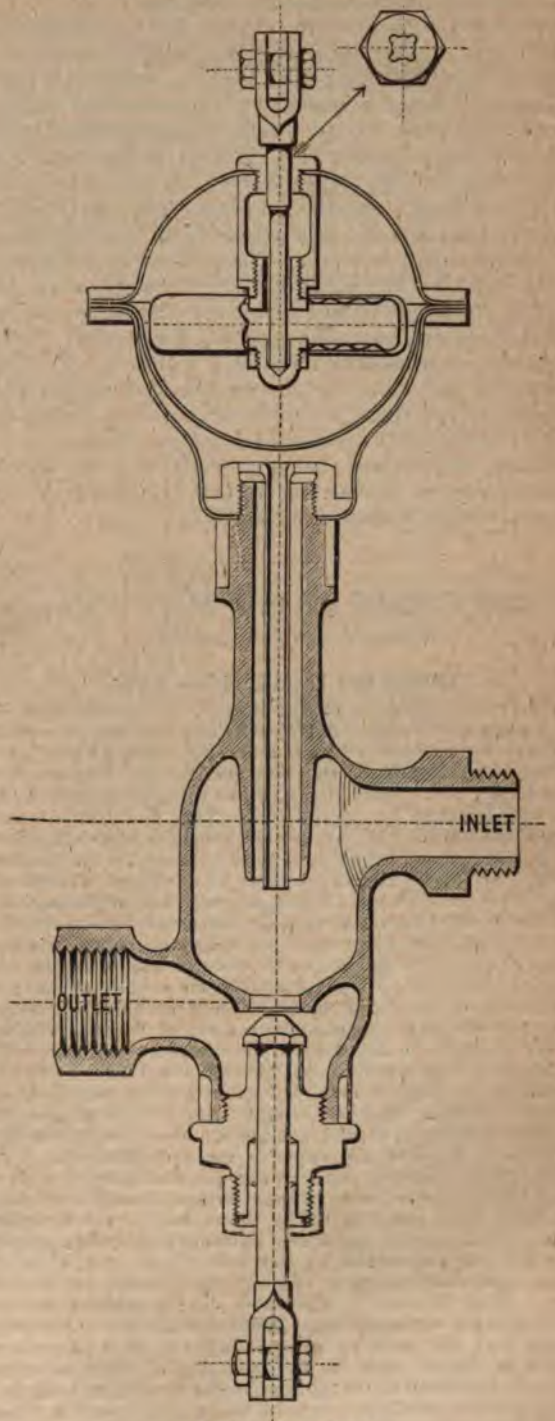
Assuming the trap to be passing water in quantity, in which case both control valves would be open, when the quantity of water remaining is becoming less and the steam is allowed to pass by the upper passage to the condenser, the upper and small valve gradually closes which causes an augmentation of pressure at the back of the large valve-piston which closes the valve, because the larger area of the piston closes the valve of smaller area against its own pressure. At starting again, the small valve opens first by the contraction of the condenser, thus relieving the pressure at the back of the piston, and allowing the pressure at the inlet to open the large discharge-valve, the water passing the small valve being delivered by a small side passage not shown into the body of the device.

The adjustment of the trap is the same as the "Midget" trap, viz., by slackening the lock nut of the condenser and unscrewing the condenser till steam blows through, afterwards slightly screwing it in again and locking it with the lock-nut, when the trap will continue to drain automatically.

FRONT ELEVATION

Fig. 3.

In Figs. 3 and 4 we illustrate the "Absolute" steam trap, which is designed for pressures up to 500 lbs. per square inch, and requires no adjustment from *nil* up to any pressure, at the same time opening full to flush out the smallest quantity of water, and closing immediately steam appears.



SECTION

Fig. 4.

In ordinary steam-trap practice, where the expansion of fluids is the controlling factor, the moment a cooling takes place the valve opens or is supposed to do so. The opening factor (viz., the first accumu-

lation of cold water) is thereby discharged, this going first leaves the hottest to follow, which either closes the trap or nearly does so, causing, unless great care is exercised by the attendant in constantly adjusting the trap, the water to back up the pipes.

To avoid this difficulty would be to retain the first accumulation until the last, and let the hottest pass out first. This at first sounds somewhat paradoxical, but nevertheless this is the essential feature of the "Absolute" trap, which is accomplished under the following conditions:—The first accumulation of water rises into the upper part of the trap, and cools the sphere containing the condenser, causing the valve to be opened by the system of levers connecting the condenser with the valve. The cold water remains in the sphere until the accumulation of water below has passed, and when by the action of the water falling below the entrance to the sphere, the cooling factor drops out, steam takes its place, which immediately volatilizes the fluid in the sphere and causes compression of the flexible diaphragm, thus closing the trap until the next accumulation takes place.

These devices are being put on the market by Messrs. James Armstrong & Co., Limited, of 116, Queen Victoria Street, London, E.C.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

French and English Shipbuilding.

THE French Chamber of Deputies has had a very keen discussion on the subject of their subsidies to French companies for the postal services to Algeria and other North African ports. The speed contracted for on these services has hitherto been exceedingly low. Now there is a suggestion that a 23-knot speed should be insisted on. This has brought up a discussion as to the performance and subsidies of the Holyhead and Dublin service of the City of Dublin Steam Packet Company and of the Channel Islands services of the Great Western and South Western Railways. It may be remarked, in passing, that all these services are maintained by twin-screw vessels and that the paddling lines were never thought worthy of mention, though they doubtless cost much more in proportion to keep alive. M. Lockroy, who is certainly an expert, spoke with admiration of the speed under working conditions, the coal endurance and cargo capacity of the Channel Island boats, and no one who has watched their performances will doubt the justice of his comments. Why should not France have such vessels for the African service, is the question which several members raised. It was thought that in case of war they would be invaluable as despatch boats and as the lighter kind of cruiser. Some of the deputies spoke of the value of our great Atlantic liners as auxiliary cruisers, even going so far as to say that they were more valuable to a nation than so many ironclads. That one can hardly agree with. But that their value, with their great speed and immense coal endurance, will be something substantial, no one but British M.P.'s and ill-informed service writers in evening papers would be likely to deny. Then followed a discussion on the relative cost of building in the two countries. And it seems to have been finally agreed that the price of shipbuilding is at least 30 per cent. higher in France than in England. An examination of the economic conditions of the industry, in the two countries can only bring us to one conclusion, namely, that the workmen in France are not as well paid, and work longer hours than ours, and that it is the competition and close working of our shipbuilders and marine engineers that effects the whole of the economy.

Telegraph Companies' Cable Buoys.

For fully 40 years the business of laying telegraph cables under the sea has been going on, and public interest has frequently during that period been excited by the accounts of the wonderful work which is done by cable ships in the course of laying fresh cables and of effecting repairs to old ones. Of course the earlier cables were laid in a piece by the *Great Eastern*. But it has been found for many years more satisfactory to proceed in handier lengths with Atlantic cables, and, having laid what an ordinary sized ship could conveniently carry, to buoy the end, and then to get a fresh supply, make a splice, and proceed with the next instalment. We frequently read, too, how such and such a cable has been interrupted and a cable-ship sent to make it good. These operations involve in many instances the cutting out a fault.

In these cases the ends must be buoyed. How often these things happen can be judged by persons who read the reports of the companies and by those who turn up the most interesting list of cable steamers which is now appended to Lloyd's Register book.

Yet in this very month of November, 1897, it is necessary for the Eastern Telegraph Company to send a notification of the appearance and use of their buoys to the Board of Trade and to the press, to save them from destruction. They state in the notice that a buoy in use off the coast of Portugal was found to have seven holes in it. These had been made by rifle bullets. There is no suggestion on the part of the company that malice or wantonness had caused the attack on their property. They charitably attribute the attack to a desire to sink the buoy, and so get rid of what is erroneously supposed to be a derelict from some coast or channel, whose wanderings have taken it out of its sphere of usefulness and constituted it a danger to navigation. In order that this supposition may be negatived the company append to the notice a description of these floating marks. Those of the Eastern Telegraph Company can be recognised by the fact that they carry a pole with a circular wicker cage on its top, with a flag in the daytime, and a lamp at night. The portion of the buoy itself above the waterline is painted with alternate black and white, or red and white squares.

The North German Lloyd Company.

I am now at liberty to explain the meaning of a somewhat obscure remark which I made in the September issue of these Notes. It was to the effect that the North German Lloyd Company was "contemplating a move which might have startling results for the less progressive companies." The move in question is neither less nor more than the practical rebuilding of the steamers *Spree* and *Havel*, which, till the coming of the *Kaiser Wilhelm Der Grosse*, were the two crack boats of this the most important foreign line in existence. These vessels are of about 7,000 tons gross register, and were built and engined by the Vulcan Company of Stettin, some seven years ago. The engines were of the five-cylinder triple-expansion type, and the speed and economy of the steamers have never been questioned. But the single screw was adopted in the case of these vessels and it was a mistake which the directors of the company now frankly and wisely admit and seek to remedy. The last argument, feeble as it is, is now taken away from those British Mail Companies which, in pursuance of a penny-wise policy, continue to turn out single-screw ships. They said that the fact that the North German Lloyd built the *Spree* and *Havel* on this principle justified them in their continuing to build their ships in the same way. The many recent vessels which North German Lloyd have added to their fleet have all been twin-screws, and that of course shewed that the company had realised its mistake. But the intention to alter these modern vessels is a very strong accentuation of their belief in the absolute necessity of duplication of machinery in mail and passenger steamers.

The present dimensions of the two boats under discussion may be noted here. They are—Length between perpendiculars, 463 ft., beam, 51 ft. 9 in.; depth, 34 ft. 1 in. It is proposed to cut each vessel in two, and lengthen her. I have not yet heard what the exact length of the improved ships will be, but it will certainly exceed 500 ft. Even then the vessels will be ten times their beam in length, whilst their speed will probably be improved, and their earning power will certainly be very largely increased. Then twin-screw engines will be substituted for those at present in use. That will necessitate the practical rebuilding of their after bodies.

The work will, of course, be done in Germany, and probably by the Vulcan firm. There is a report that England will benefit a little by the order, inasmuch as the firm of Messrs. C. S. Swan & Hunter have got an order to build a pontoon dock on which the operations will take place.

This story, whether it be correct or not, acquires a certain probability from the fact that Messrs. C. S. Swan & Hunter built

floating dock for Havannah, and in doing so startled by the rapidity with which it was turned out. I may that the New Zealand liner, which was entrusted with y task of towing this great structure out, accomplished in a very satisfactory manner. The course chosen over 6,500 nautical miles, and the operation was per- in 59 days from Shields to Havannah. The total includes Spithead for water and other final stores.

The Bristol Dock Scheme.

prognostication that the proposed extension of the Dock at Bristol would not come to fruition has been realised r than I anticipated. Quite early in November it was ed at the meeting of the Bristol Town Council that the tion of the Bill for the proposed works could not be pro- with during the forthcoming session of Parliament, and the scheme must be postponed. It is true that hopes are that there may only be a year's delay, and that the ry Parliamentary sanction may be obtained during the of 1899. But we take this assurance for what it is

rock upon which the proposal split, is that which wrecked heme of 1893. It is the impossibility of getting the two railway companies who serve the district to come to terms the matter. Nothing can be done without their sanction, their property would be considerably interfered with, for would have to be altered, stopped and diverted. Parliament already indicated certain ways in which the expansion of the Dock system must take place. Assent to any deviation this legal obligation is unlikely to be obtained from railway ds who see their own monopolies in danger of being thrown to powerful rivals. And so Bristol must wait for a year tainly, and possibly for a great deal longer, for though tiations are to be continued with the companies there seems little chance of any useful result being attained by them.

Whilst Bristol has been so busy discovering its inability to rease the facilities it can offer to customers, the comparatively port of Blyth, on the other side of the kingdom, has been ing a fine new graving dock, which it has constructed with- any noise or fuss.

The dimensions of this new dock are :—Length, 480 ft. ; width entrance, 61 ft. ; depth of water on sill, 22½ ft. The opening emony consisted of the formal admission of the new steamer, *Port Victoria*. This vessel belongs to Messrs. Milburn's firm, with which the Dock company is largely allied, for the senior partner in the firm is chairman of the company, and his wife it was who performed the opening ceremony. It is perhaps noteworthy that in his speech at the opening, Mr. Milburn, who wished to give an idea of the maximum capabilities of the new dock, should have chosen as his illustration the African Steamship Company's new vessel, the *Milwaukee*, of a deadweight capacity of 11,700 tons. For it was to induce this ship and her sisters, built and building, to use their port, that made the Bristol people go in for their still-born effort. So Blyth, a modern go-ahead port of the East coast, hardly known outside shipping circles, can do that which beats the town that prides itself on being "the metropolis of the West." This dock is the fifth of which the port can now boast. Of these three belong to the Blyth Dry Dock Company and two to the Blyth Shipbuilding Company. The trade of the port is increasing by leaps and bounds. Last year 2½ million tons of coal were exported. This year the total is expected to reach three millions, and new sources of supply are being opened which will very soon bring the annual export up to four millions. That is the amount which the most sanguine expectations of those who were identified with the early history of the port had hoped for. Attention is also being paid to the improvement of the existing facilities and endeavours are being made to minimise the breakage of coal shipped from the staithes of the port.

Publications.

From the North German Lloyd Company I have received a little illustrated booklet on "The North German Lloyd Steamship Company's Express Service from Bremen, London and New York." This is entirely a volume for possible s. It gives some account of the various services by the great company, with especial reference to d with New York. Its illustrations are concerned the passenger by rail and by steamer, on inted, and the pictures, especi- less nearly connected with the Great Western Railway Company's route from Plymouth to London, are really good.

The American Line.

This company's express service between Southampton and New York has recently been carried on by the two Cramp built vessels, and the *Paris*, sailing on the three weekly round. It is announced that arrangements have been made with the Newport News Dry Dock Company to overhaul and improve each of the three vessels now at work, one after the other, the *New York* meanwhile relieving them. A matter of 200,000 dollars is to be expended over the business, and the ships are, when the job is finished, to be equal in speed to the *Kaiser Wilhelm der Grosse*. This I take the liberty to very much doubt. The amount of money named will only pan out to a matter of fifteen thousand pounds per ship, and as that money is to be spent in America, not more work can be done on each than an English firm would do for, say, ten thousand pounds. One knows how expensive it is to alter these big vessels, and one can hardly suppose that much can be done unless the sum named be very largely exceeded. For example, the *Spree* is not quite equal in speed to any of these three American liners, and the higher the original speed the greater the cost in power of every additional knot. Yet it is announced that the H.P. of the *Spree* is to be increased no less than 50 per cent. under her proposed alteration, and that 50 per cent. is expected to give her an extra knot and a half—just about what the American Line boats would require to put them on a par with the new German flier. No one would imagine that for the sum named anything like an additional 10,000 H.P. per ship could be put into the *Paris* and *St. Louis*. So there is something weak in the story as at present put forward.

Meanwhile, rumours are flying about as to the Newport News Company itself. It is said that additional capital is to be put into it by British capitalists, though, of course, the requirements of the American law will not allow its nominal ownership to be changed.

The Advantage of Carrying Pigs in Passenger Vessels.

The Disaster Column of the *Shipping Gazette* is not a place to which one would usually turn to for strange tales or amusing incidents. Yet the account of the loss of the *Illawarra* Steam Navigation Company's twin screw steamer *Kameruka* contains a very curious tale indeed. The vessel was on a coasting voyage from one Australian port to another, and struck on a reef at midnight. She was not a large vessel, and she had on board no less than fifty passengers in addition to her crew. There were none of the usual appliances to make connection with the shore available, and the plight of those on board apparently looked desperate till Captain Sutherland was seized with a brilliant idea. He had some pigs on board, and these he sent off swimming towards the shore with lines. In this way a connection with the land was established and all on board saved. It is unfortunate to add that the ready-witted skipper was so injured that his recovery is doubtful. But what as to the pigs? There is a popular idea that pigs cannot swim. This is not quite accurate, though in ordinary cases it would be sufficiently near the truth. If in good condition pigs cannot sink. But the operation of swimming is fatal to them because their trotters lacerate their throats at every stroke and, accordingly, their immersion, if continued, must be fatal. Whether these life-savers survived or not the *Shipping Gazette* failed to mention. But perhaps if the circumstance is well authenticated the thirteenth schedule of the Merchant Shipping Act, 1894, which forbids the carriage of pigs in emigrant ships, will be withdrawn, and a careful government will insist that a due supply of these life-saving appliances be carried in all passenger steamers in proportion to the number of souls on board.

The P. & O. Company

have launched the fourth of the great mail steamers, comprised in the sisterhood last added to their fleet, in view of the approaching acceleration of the mail contracts. She is called the *Arabia*, and is a sister to the *Egypt* which I discussed last month. She is, therefore, again a single-screw vessel. Messrs. Caird, of Greenock, built and are engining her. A correspondent has written to make inquiries as to the speed of the *Egypt*. I am very sorry that I can give him little information. Her performance on trial was "highly satisfactory." But no details transpired. She, however, made a trip from Southampton to Cherbourg with the directors and a few of their friends. On it she was said to have done "140 miles in

six hours, that is a speed of about twenty-three miles an hour." Now that statement will not, of course, bear critical examination. The "twenty-three miles an hour," in the first place, must have been a translation of the phrase "twenty knots." We know nothing of the tide which was running at the time, and tides in those waters make a vast difference to the speed over the ground. But we do know that 19 knots on trial was her designed speed, and she is hardly likely to exceed that. Seventeen knots at sea will be about what she could maintain, and that is quite enough to give a very fine margin for a contract which, when accelerated, will only entail an average of 14½ knots. She will seldom, therefore, have to approach the 11,000 I.H.P., which is given as her maximum H.P.

American Shipping.

There seems to be no longer any chance of smart people getting their British built ships on to the American register by sandwiching them in with the intended new American colony. Notice is given that for the present—that is, we may presume, till something definite is arrived at between the Pacific Island and the United States—no foreign-built vessels will be admitted to the Hawaian register. So the example of the *China* cannot be followed. The Americans seem to have suddenly turned their attention to the West Indies, and to be endeavouring to improve the means of communication between the port of New York and the more important islands. The existing mail contract with the New York and Cuba Mail Company is to be renewed for five years, and the remuneration is to be calculated on a basis of a dollar a mile steamed. It has been stated that the contractors would be compelled, in view of their increased obligation to build four fine, fast vessels, and would thus give the biggest mercantile order to American shipbuilders, which has been given since the American line ordered their two big boats. It is now reported, however, that all that is to be built at present is a single vessel, whose speed is to be 16 knots and tonnage about 5,000. She will however, be required to be built in accordance with the Navy Office rule for use as an auxiliary cruiser in time of war. The company at present has under a dozen vessels, of which the most important is the *Seguranca*, built seven years ago at Delaware by the Roach Company. She is just over 4,000 tons gross. Her length is 321 ft., and she has triple-expansion engines driving a single screw. At the same time the same firm built four other vessels of similar size and class, so that even an order for four vessels would have precedents to justify it.

The West India trade, indeed, has occupied a good deal of public attention lately. This is, of course, largely due to the report of the Royal Commission. That body stated that complaints had been made to them of the Royal Mail Company's service, and it rather suggested the starting of a subsided line of fruit carriers, not mail boats, to New York for the purpose of marketing the bananas which they desire that the British West Indians should grow. But the Royal Mail Company's report, which was published at the end of October, gives no indication of wasteful or extravagant management nor of the possession of an out of the way subsidy which puts taxpayers' money into shareholders' pockets. The indications were rather the other way. For the return the shareholders took was not earned by the running of the line, but by the careful navigation of the vessels by the captains, and by the freedom from expensive breakdowns in the engine-rooms, thanks to the watchfulness of their engineering staff. Thus it would appear that the colonists get all their money entitles them to from the company. But if a line of fruit boats is wanted and the necessary guarantees are forthcoming the Royal Mail Company announces its willingness to provide it.

The American Press.

Though the American technical Press is of a very high order, the general newspaper writer seems to pride himself on the balderdash which he can beguile the public into reading. Under the head of "A Curious Superstition" there has been going round a paragraph which states on the authority "of an American journal" the "marine insurance underwriters" always fight shy of vessels whose names end in "a." "Such a vessel is looked upon generally as a hoodoo," whatever may be intended to be conveyed by that elegant expression. Now, we on this side of the water cannot say what American experience is. But the allegation of bad luck is based not merely upon American experience, and the superstition is said to be generally prevalent in the whole underwriting business. The names of vessels owned on this side of the herring pond are cited. Now one may be quite willing to believe that a fair number of ships are lost whose names end in the way indicated. For a very important class of proper names has such a termination. But when it is remembered that the majority of the vessels' names in some of the largest fleets, and some of the most fortunate, end thus, the absurdity of the story is manifest. The Hamburg-American, Cunard and Anchor Lines, for example, all go in for a final "a," and so have a good number of the most famous P. & O. vessels. The Anchor Line had a short run of bad luck a little while ago; but generally these lines have been notably fortunate even above the average of vessels of their own high class. It is indeed an astonishing and noteworthy thing, now that attention is called to it, that when some of these lines have made an exception and built ships with names with other terminations, or have bought in ships of other lines and for some reason not altered their names to fall in with the rule of the fleet, these vessels have been the ones to be picked off by fate. If the superstition exists, therefore, it must debar some marine underwriters from some of the best risks. But I am inclined to think that the refusals, if any, on which the story is based were due, not to superstition, but to secret knowledge of the undesirability of vessels offered to them.

The Castle Line.

The company's new steamer, *Carisbrook Castle*, was safely put into the water at Fairfield on the 28th October. She is in many respects a new departure for the line. In the first place she is of an increased size, being 500 ft. long over all, and about 7,500 tons gross register. The general appearance as to rig and funnelling is that of the *Dunvegan Castle*. But her main saloon is forward of the engines instead of aft. The comfort of all classes is greatly studied, the questions of ventilation and of the water supply being exceptionally carefully thought out. But it is in her engine-room that the greatest improvements are noted. The engines are quadruples, and in this respect differ from all the vessels of the line, save the *Tantallon Castle*. They are supplied with steam at a pressure of 205 lbs., which is the highest pressure yet attained in the Mercantile Marine, at least with return tube boilers. The machinery is balanced on the Yarrow-Schlick-Tweedie system, and it is thus hoped that vibration will be quite inappreciable. Brown's telemotor, actuating a steam tiller, is again employed for steering. In the auxiliary machinery department too great changes have been made, the use of electric machinery being largely resorted to for the smaller auxiliary and sanitary pumps. The vessel, it may be said briefly, seems to be peculiarly adapted for the comfort of all classes of passengers, even the humblest, in the tropical climates through which the vessel passes on her voyages to and from the Cape.

The Canadian Mail Service.

Since we were informed that the deposit of £10,000, payable within 60 days of the making of the mail contract, had been made by the contractors, Messrs. Petersen, Tate & Company, upon the demand of the Canadian Government, we have heard nothing of the new fast service.

But the present-day contract seems to give enough excitement for a while. There is an interim to be filled in between the date in November, 1897, when the old mail contract with the Allan and Dominion Lines expired, and that future time when Messrs. Petersen, Tate & Company begin running their service of 20-knot steamers. The announcement was made some time ago that the Canadian Government was prepared to receive tenders for a mail service for the first year of this interval. The service was to be a weekly one, from Liverpool *via* Londonderry to Canadian ports. These ports would be the usual St. Lawrence ports during the open season. But during the period when the St. Lawrence is closed they made a new stipulation, to the effect that the mail-carrying company must not send its vessels on to a United States port after landing its mails in Canada. This would knock on the head the old winter arrangement of the Allan and Dominion Lines, who left their mails at Halifax and then went on to Portland, Maine. So these lines did not compete, and in the result the Beaver Line has got the contract, and once more the McIver family is managing the mail line to an Eastern Canadian port. Strange indeed is this, and stranger still is the fact that the old *Gallia* is the first vessel they despatch in the new service. The last sailing *via* Londonderry was made by the Allan Line with their s.s. *Parisian* which left Liverpool on the 18th November, and thereafter the weekly steamer of this line proceeds from Liverpool to Portland

direct. So do the Liverpool Dominion boats. The Royal Mail steamers of the Beaver Line, after calling at Moville for the mails, proceed direct to St. John, New Brunswick, and this is to be their terminal port. The *Gallia* made the first sailing under the contract on the 20th November. It is said that the subsidy amounts to £600 a voyage. In addition to this the Allan Line has a fortnightly mail service from London. I may mention in connection with the new mail service the fact that Captain Taylor, who commanded the *Lake Winnipeg* on her stormy and protracted voyage early in the year, has just been the recipient of a testimonial on account of his conduct on that occasion, whilst all his crew have been accorded some recognition of their services. The Captain himself has been promoted to the command of the *Gallia*, and he deserves it, for in the hands of a less determined officer the vessel would assuredly have been abandoned and the underwriters called upon for a total loss.

The Union Liner "Briton."

which is to leave Southampton on her maiden voyage for the Cape on the 4th December, is spoken of as "the largest British vessel which has ever left a British port for a British colony." She is a big ship, truly. But the *Great Eastern* was a bigger. India is not strictly a British Colony, and so the *Great Eastern's* visit to Bombay does not quite meet the case. But Canada is certainly a British Colony, and the *Great Eastern* went out to Quebec in the sixties. The boast of the *Briton's* admirers is therefore not quite accurate.

The Loss of the "Aden"

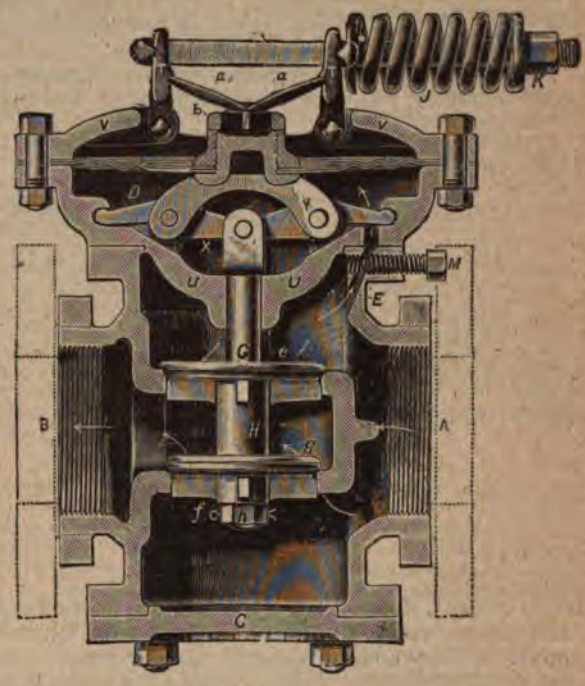
There has been a feeling in the minds of those who were interested in the passengers of the ill-fated P. & O. steamship *Aden*, that all was not done that might have been to make sure that the missing boat from the steamer did not in fact reach the coast of Arabia. So a few weeks ago the Indian Government steamer *Mayo* visited the ports at the south-west extremity of the country, and found that though the natives knew of the wreck, they had seen no trace of the boat or of its occupants. It is now reported that a gentleman who lost his family in the wreck has made arrangements to personally search for traces of them. We cannot but wish that his search may be successful, and we cannot help admiring the devotion which he shows. But under the circumstances it is to be feared that the chances are remote indeed. We are bound to assume that the owners of the vessel left no possible stone unturned for the recovery of all possible survivors from this disaster.

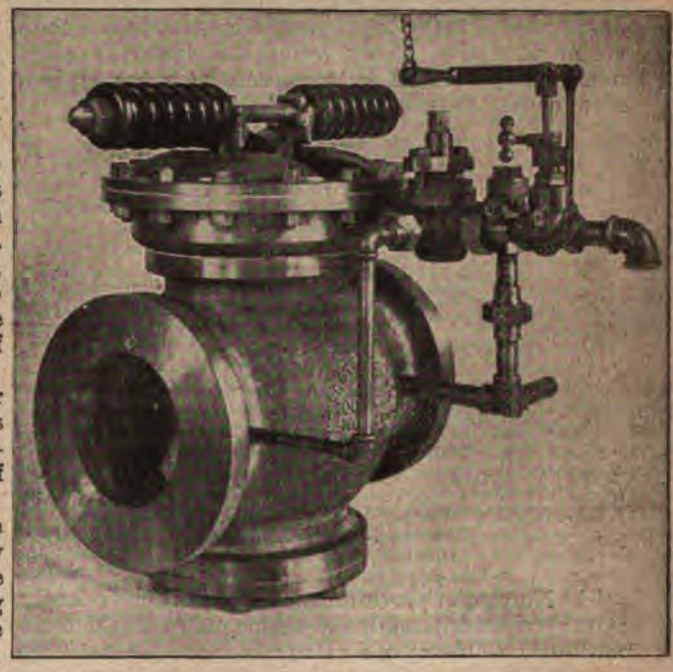
PROTECTION FROM BURSTING STEAM PIPES.

WE are glad to find that our Editorial remarks in our last issue, upon the lamentable accident resulting from the bursting of the main steam pipe on board the *Thrasher*, has elicited responses from Messrs. W. H. Bailey & Co., Limited, of Salford, Manchester, and from Mr. P. Paasche, of Bergen, Norway, as to special means devised to protect the staff of the engine and boiler rooms from the disastrous rush of steam and boiling water from a burst steam-pipe.

These devices we have pleasure in illustrating for the benefit of our readers. The first is Foster's automatic safety valve, for bursting steam or water-pipes, as made by Messrs. Bailey & Co., Limited, of Salford. The action is a very pretty one, depending upon the differential action of a spring and a steam or water-pressed diaphragm, operating automatically a double-beat balanced valve. This valve would be fitted in a steam pipe close to the boiler, and so long as the service pressure was maintained in the pipe, the internal pressure of the steam upon the valve, which obtains access under the diaphragm from the discharge side of the valve, would hold the valve widely open, so as not to offer any obstruction to the passage of the normal volume of steam. When, however, a breaking or bursting of the steam occurs, the service pressure immediately falls, and the diaghragm and the valve spindle collapse under the external adjusted pressure of the outside spring J, and the valve automatically closes.

It is, however, suggested by Mr. P. Paasche that



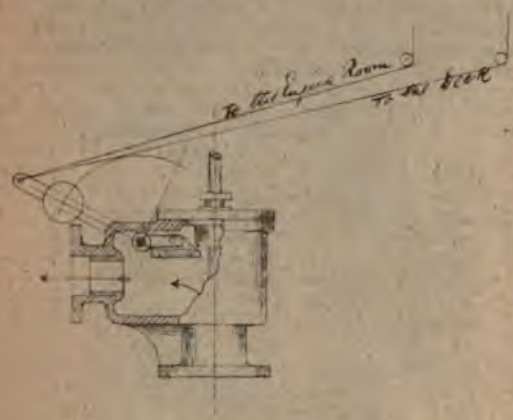


any form of automatic check valve which is held in delicate balance to automatically close with an extra rush of steam, may not always be reliable, and might require too heavy a rush of escaping steam before

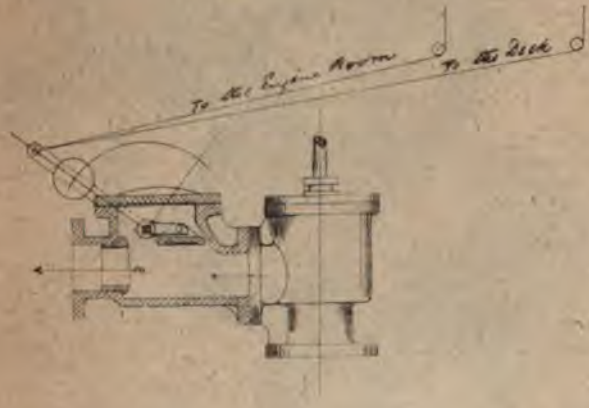
coming into action, and would be in ordinary work a hindrance to the free flow of the steam in the pipe.

We should be pleased to hear what Messrs. Bailey & Co. may have to say upon such criticisms, upon the reliability or efficiency of such an automatic valve as supplied by them. No doubt it has by this time passed the ordeal of practical experience.

Mr. Paasche reports that the question of protection from bursting pipes has been before the Norwegian



Government, consequent upon the application of the Norwegian Society of Marine Engineers for legislation on the subject, and in response the Government have issued the following order:—"Every new steamship or ship having new boilers shall, in addition to the usual screw-stop valve, have a system of arrangement of valve approved by the Government or Government Inspector, whereby in case of accidents to the main steam pipe the steam from the boiler can be immediately shut off by operation from the engine-room as well as from the deck."



The Norwegian Government does not thus evidently rely upon an automatically acting valve, but pins its faith to the efficacy of a valve which can be instantly operated to close in the same direction as the rush of escaping steam, and which shall be operated by hand from some vantage point in the engine-room, or from a point of safety on deck. This can, no doubt, be effected in many ways, and we have pleasure in illustrating a form of such valve as designed by Mr. Paasche, and applied by him successfully to more than a dozen of vessels sailing from Bergen. The design is simple, and speaks for itself. There is no obstruction to a clear way in ordinary work, and the valve being a flap pivoted valve cannot fail to close when operated by any one of the many cords which may lead to any convenient or vantage points in the engine-room or on deck.

TRIALS OF ANOTHER ROLLER STEAMBOAT.

THE preliminary trials of the roller ship—or rolling cylinder rather—having for its author Mr. F. A. Knapp, a lawyer, of Napanee, near Toronto, which, like the Bazin ship, was to roll into undying celebrity, and revolutionise naval architecture, have now been made, and the result is—as was largely foreseen—all but total failure. Instead of the phenomenal speed anticipated by the designer, the craft has only been able—according to a statement in the latest issue of the *Scientific American*—to roll at the snail-pace rate of six miles an hour, even in smooth water. This maritime oddity was launched about the middle of August, and briefly described is 110 ft. long, 22 ft. diameter at the middle, tapering to about 15 ft. at the ends, and consists of an outer and an inner cylinder, there being a space of about 3 ft. between the two. The inner cylinder, in which the engines, boilers, fuel, and other weights—including passengers—are arranged on platforms, is held stationary and level under all circumstances through the force of gravity, but attached to it are wheels running on grooves or rails laid along the inner circumference of the outer cylinder. Motion is imparted to these wheels, and by this means a rotary impulse is given to the outer cylinder, much in the same way that the pet-squirrel rotates his circular cage. The rotary motion is translated into a rolling one of forward progression through the media of rigid webs, projecting from the circumference of the outer cylinder. The advance is, of course, made "broadside-on," not in the line of the vessel's length. The draught of water is said to be about 2 ft. 6 in., thus leaving about 19 ft. 6 in. of the structure above water. The immense surface exposed to wind pressure, and the clinging of the water to the blades and surface on the after-side of the cylinder, have no doubt contributed to a vast extent to the non-realisation of the designer's dream of a phenomenal rate of speed. Even had the success anticipated as to speed been attained the problem of inducing people to take passage in this gigantic revolving barrel, "perfectly ventilated," &c., as it may be, would have proved a fatal enough obstacle to its triumphant advent on the Atlantic.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

An Unfortunate Business.

THE engineering dispute does not seem to have got much further towards a solution, despite the conference which has taken place, than it was a month ago. Shipbuilding in the various yards, although just at present it does not show many signs of coming to a standstill, will certainly be in a somewhat comatose state next year, even if the difficulty is settled before Christmas. The material which is being utilised at present was nearly all manufactured before the dispute commenced, and vessels which are about to be commenced will most likely have to wait for armour, armament and engines which should have been in the workmen's hands during the last three months. The matter is extremely serious, especially when the activity in Continental dockyards is taken into account. France and Russia are building as rapidly as they possibly can, and the present delay in getting ready the materials for battleships, designed but not yet on the slips, will allow them to forge ahead in a manner which will take us a year or more to catch up. It was the intention of the Admiralty to show our rivals that even the proud feat of building the *Majestic* in twenty-two months could be beaten, and

that at Portsmouth, Plymouth, and Chatham battleships should be laid down and completed in twenty months, but this is all knocked on the head now.

The Effect of the Dispute on the Admiralty.

The outcome of it all will be that the Government will vote money for the laying down of extensive plant for the construction of machinery for our warships in the Royal dockyards. It is more than probable, too, that this money will be voted in next year's Naval Estimates. Already much of the engineering work which would, in the ordinary course of events, have been given out to private contractors, has been ordered from the engineering departments of the great dockyards, and a considerable increase in the number of mechanics employed there has taken place. The boilers and engines, for instance, of the new gun sloop which will be laid down at Sheerness, are to be built at Devonport dockyard. This work would certainly have been given out to one of the large private yards, but the inconvenience experienced by the continuation of the dispute has been so great that the Admiralty at length resolved to put the material together themselves. A new boiler-house and workshops are being erected at Portsmouth, and before long work in this direction may be extended. The launching of the battleship *Ocean* will not take place now until June next, whereas, if this unfortunate dispute had not occurred, she would have taken the water this month. The *Goliath* too, is having her stem and stern pieces delivered in an unfinished state, and the Admiralty have decided to complete them in the dockyards at the expense of the contractors.

New Warships.

The *Pelorus* type cruiser has proved so satisfactory that the Admiralty have decided to commence the construction of another vessel of the same type at Portsmouth Dockyard. It has been suggested that first-class cruisers, built on somewhat the same lines, would be a very useful addition to the Navy. The new ship will be named the *Pandora*, and she has been designed by the Chief Constructor for scouting purposes. Her length will be 300 ft., breadth, 36 ft. 6 in., and displacement 2,135 tons. She is to have engines of 7,000 I.H.P., with forced draught, 5,000 with natural draught, and she will be fitted with water-tube boilers. It is expected that it will be possible to maintain a speed of 18½ knots for a considerable period with natural draught, but that when forced draught is used 20 knots will be obtained. Her armament will consist of eight 4-in., and eight 3-pounders quick-firers, with machine guns, and Whitehead torpedoes. Her machinery will be made in the dockyard, and her cost will approximate £160,000. Two other vessels of the same type are to be laid down, and the new sloops *Condor* and *Rosario* will be commenced shortly. They will be fitted with water-tube boilers. The four new gunboats provided for in this year's Naval Estimates are also to commence building shortly. Messrs. Potter & Co., of Liverpool, and the London and Glasgow Shipbuilding Co., Glasgow, are to build them. They will be a decided improvement on the *Redbreast* type, which Sir William White designed in 1887, for they will be provided with quick-firing guns, and all the most modern improvements. They will displace 850 tons, and are to have a high speed.

Portsmouth Dockyard.

We have plenty of work of every sort in hand here, and if no other orders are received from Whitehall for a month or so there is sufficient work to keep everybody busy. The *Cæsar*, *Hannibal* and *Canopus* are in hand, the *Gladiator* is under construction, several vessels are waiting for refit and preparations are being made for the laying down of the *Pandora*. This ship will be commenced shortly in No. 11 dock. The new *Majestic* is also to be thought of. It will not be long now before we receive her drawings, but there is no great hurry as much of the work in hand has been delayed owing to the engineering dispute. It is worthy of notice that the Graham patent loud talking telephone has been fitted on the *Cæsar*. The noises made by the machinery or by the firing of guns do not affect this in the least, according to the inventor. Some excitement was caused here a week or two ago by the cry of "Fire" on board the cruiser *Latona*. Fortunately the outbreak was discovered and extinguished before much damage was done. It is supposed that the origin of the fire was the spontaneous combustion of some oily waste in the engine-room. The *Royal Arthur* has been commissioned by Captain C. G. Dicken in order to take up the duty of flagship on the Australasian station. She has been provided with a complement of 559 officers and men. The *Wye* has been supplied with stores for Sierra Leone and Ascension. Her trip will extend over two months. The *Swiftsure* has completed her refit and is to be passed into the A division of the Fleet reserve.

A New Torpedo.

The new automobile torpedo, which has engaged the attention of naval electricians for so long, will, it is expected, soon undergo practical tests. The paper plans are to be converted into steel, and if the trials are satisfactory the invention will be the sole possession of the British Government. Capt. C. J. Briggs, who has been appointed to the command of the *Vernon*, will, with the assistance of several scientific officers who have had positions on the *Vernon* for some years past, concentrate his chief attention to the new missile and bring it to completion as soon as possible. Admiral Wilson was the first to conceive the idea of improving on the Whitehead, and among those who are helping him in the development are Capt. W. H. May and Capt. Durnford. The details of the new weapon are as yet a profound secret and an effort will be made to keep it so. Admiral Wison also invented the *Vernon* net defence cutter, which is considered by many as one of the best things of this sort in existence. If this torpedo is as good as is claimed for it, he will be regarded, not only as a very clever inventor, but as a public benefactor and peacemaker. The sterling qualities of the Whitehead torpedo are known only to experts, and if the new torpedo can improve upon this remarkable weapon it must possess some very remarkable features.

The Recent Insubordination in the Navy.

The recent insubordination in the Navy is the cause of an article in one of the journals devoted to the interests of naval warrant officers. Warrant officers should certainly know as much as anyone the case of the many acts of insubordination which have lately taken place, as they themselves are of and from the lower deck. Yet according to their journal too large a percentage of recruits from the slums and byeways of our large cities are accepted, and that the "young ruffians," gathered in this way, when they begin to realise what disciplined life means, at once resolve to free themselves at all costs from restraints which are as shackles and bonds to the personal license they have been allowed in their old haunts. What we require, adds the paper, are more honest, robust, high-spirited, intellectual lads, who love a roving, roystering life, and who have been raised in the atmosphere of pure and healthy morals, and with the helpful restraints of respectable parents and pure home life. It believes too that the Navy could get the service of such lads, if to the fascination of a sailor's life were added the opportunity of rising to a commissioned rank at a decent age, and a rank equivalent to that obtainable in the army at a little later period. Service in the Navy will have to alter very much before such a thing is possible, and the day when stokers and firemen become commissioned engineer officers and ordinary A.B.'s commissioned combatant officers is very far off. But this is not responsible for the many cases of men or boys striking their superior officers, and if such a scheme were made to work we do not believe it would have much effect in preventing the acts of insubordination which have recently been made so much of in the ordinary daily press.

Devonport Dockyard.

Much activity is apparent here consequent upon the amount of commissioning and refitting which has taken place during the last few weeks. A double commissioning took place about the middle of last month, when the *Sirius* hoisted the pennant for transport service, and the *Ringdove* for service on the Australian station. The *Doris* and *Magicienne* have also taken up much time in their preparations for commissioning. These vessels have taken up a great deal of docking accommodation and several vessels were waiting to take the place of any that were undocked. The *Lynx* has also appropriated a dock to herself in order to have the necessary repairs made to her. The completing touches are being put to the *Arrogant*, which is now almost ready for acceptance from the contractor's hands. The *Raleigh* has passed over to the Reserve, but it will be January, or perhaps later, before she hoists the pennant as flagship of the training squadron. The first-class battleship *Ocean* seems to have been particularly unfortunate during her period of construction. Owing to many causes she will not be able to take the water until well into the new year, as it is proposed to build new launching ways, as the weight of material which has been built into her has assumed such gigantic proportions

that special precautions have become necessary to get her safely into the water. She weighs now nearly 5,000 tons. She has just received and had placed in position the bulkhead armour-plating of the after barbette, weighing 90 tons. Work on the cruiser *Furious* is practically at a standstill, owing to the dispute in the engineering trade. The delay in getting the vessels ready for the pennant will add enormously to their cost.

The Protection of our Harbours.

Opinions differ as to the advisability of choosing Dover Harbour as the site of the new harbour for our battleships. It will not exactly be a naval base, but rather a modern substitute for the historic anchorage of the Downs. The new harbour will be something like 600 acres in extent, and beyond the 5-fathom limit there will be an area of 315 acres. Accommodation will be found for about twenty battleships, besides numbers of smaller vessels. The necessity for such an anchorage as is projected, is apparent to everyone who has studied the development of torpedo warfare, and it will be a great advantage to have an anchorage on that part of our coast which will be absolutely safe from the attacks of the enemy's torpedo boats. The five gunboats which are to form part of the defence of Southampton Water are to be kept moored near at hand, and each of them will keep on board its own section of the boom defence, and each vessel will always be ready to make its own section fast to the others. The boom will really consist of steel hawsers and balks of spiked timber. The five gunboats will be moored broadside to each other with the bulks of timber end on between them. Then a steel hawser will be stretched 12 ft. above water, and another hawser will be stretched below the water-line. This, it is hoped, will be effectual in keeping out any prowling torpedo craft. Portsmouth Harbour is to be defended in a similar manner. These booms will be assisted by a system of batteries of 6 and 12-pounder Hotchkiss quick-firing guns. Six-pounders have been mounted at Portsmouth, Devonport, and Pembroke for some time. A revolving steel hood or shield 8 in. in thickness will protect these guns and the gunners. The guns have an effective of 1,500 yards, and search lights will be fitted up to assist them in stopping a destroyer or torpedo-boat rushing the passage.

Trials and Launches.

The eight hours' natural draught trial of the *Illustrious* has had to be postponed owing to the breakdown of one of the induced draught fans. The result of her thirty hours' coal consumption trial was as follows:—Draught of water, forward, 25 ft. 7 in., aft, 20 ft. 6 in.; speed 14·51 knots; steam pressure in boiler, 142 lbs. per square inch; revolutions, 83·1 starboard, 83 port; H.P., 3,101 starboard, 3,054 port—total, 6,155; coal consumption, 1·77 lb per I.H.P. The two hours' natural draught trial of the *Porpoise*, previous to her departure for the Australian station, where she is to relieve the *Pylades*, was on the whole, satisfactory. She has had an extensive refit of hull, boilers and engines, and was required to develop 2,200 H.P., but without any air pressure, and with 128 lbs. steam in the boilers, the engines exceeded this by 37. The revolutions were 132 per minute, giving her a speed of 15½ knots. The three hours commissioning trial of the machinery of the *Royal Arthur* was carried out at Portsmouth. The draught of water was 24 ft. 9 in. forward, and 26 ft. 1 in. aft, and the pressure of steam in the boilers 134 lbs. while the steam air pressure was 53 in. The I.H.P. with 96·9 revolutions starboard and 95·65 port, was, 9,700, giving the cruiser a speed of 18½ knots by the patent log. The trials of the new cruiser *Diadem* will take place at Greenock, and will occupy about a fortnight. Arrangements are being made at Portsmouth for her reception early in the New Year. She will then be completed for sea as quickly as possible. During a trial over the measured mile the destroyer *Crane* reached a highest record speed of 32·49 knots, but in consequence of an air pump leaking the further continuance of the trial had to be abandoned.

Chatham Dockyard.

Of the ships building here the *Goliath* and *Vindictive*, the first named makes the faster progress. The completion of the *Illustrious* has released about 500 hands, which have been turned on to the *Goliath*, *Vindictive*, and other vessels in course of refit or construction. Nearly 500 tons have been built in her up to the present and she has some 2,000 men working on her. It is expected, however, that the delivery of her gun mountings and armour plates will be somewhat behindhand, and this may make it practically impossible to have her ready by the time fixed by the Admiralty. It has been decided finally that the *Skipjack* shall be sent to the works of Messrs. Palmer & Co., Jarrow, for the repairs and refit which are necessary, instead of being taken in hand at this yard, as was originally intended. The work in connection with her gun mountings and torpedo fittings will not, however, be carried out at Messrs. Palmers, the vessel will be sent back to this yard to have that part of her refit attended to. The *Sheldrake* has also been sent to the same firm to be fitted with new machinery. She is of the same type as the *Skipjack*, and both ships have given their engineers considerable trouble. Their speed was supposed to be 19 knots, but the average has been about half that number of knots. The trials of the *Illustrious* have so far been successful. An average speed of 16¾ knots was obtained with natural draught, exceeding the contract speed by half a knot. The *Triton* is here waiting to have defects made good, and to lay up for the winter. The outlook as regards work is very bright indeed, and it is calculated that the amount in hand at present is greater than any previous year.

The Speed of our Warships.

The question of the utility of high speed in our warships is one that has engaged the attention of naval experts for some time. M. Normand, the well-known French torpedo boat-builder, commenced the controversy. There is certainly much to be said in favour of M. Normand's contention in favour of less engine power and boiler space and coal storage, and a much heavier and more powerful armament on our battleships than is the case at present. But whether he is right or not, there is no doubt that England is rich enough to have a fleet of warships built mainly for speed, and another fleet chiefly for the power of their armament. In this case the fast ships might overtake the enemy and harass him until the more powerfully-armed vessels put in an appearance. It may be that we are sacrificing too much to speed in modern battleships, but other European Powers are doing exactly the same, and are straining their utmost to outdo us, therefore the necessity for our squadrons to possess this very high speed at which our constructors are now aiming. M. Normand contends that the Powers in general should be content with lesser speed and revert to a 14 or 15 knot battleship. But of course such a thing is quite impossible. Each Power has and always will decide for itself as to the speed of its warships, and if it can increase this speed without materially injuring the strength of a ship's armament, the Power in question will always do so. England will not forego the great advantages in the matter of speed which is hers at present, mainly owing to the activity and intelligence of her engineers, and by the energetic manner in which she has adopted the water-tube boiler.

French Torpedo-Boats.

The new shipbuilding programme of France provides for a goodly number of new torpedo-boats and destroyers. Among these are 112 first-class boats, of 85 tons, which will take the place of the practically useless 35-metre boats, as well as those of 33-metres which are of a somewhat better class. M. Normand will build the type ship of the new class, No. 145. Nos. 206 to 211, 86 tons, and 123 ft. in length, are to be built by the Chantiers de la Gironde. Their armament will consist of two 1·4 in. quick-firers, two torpedo tubes, one in the bows and the other on a turn-table amidships. No. 206 is completed, and the last will be delivered by the end of the next Spring. Nos. 212 to 215 are being built by M. Normand, who has also constructed Nos. 200 to 205. All these are to be delivered in 1898. Nos. 221 to 222 are being constructed at the Chantiers de la Loire, and will be completed next year. Nos. 223 and 224 are being constructed at Cherbourg, and Nos. 225 and 226 at Toulon. Considerable interest will attach to the trials of these latter, for they will be the first torpedo-boats constructed in dockyards. The whole 112 boats of the new programme are to be 85-ton boats, and nine of them, Nos. 227 to 235, will be ordered this month. Thus it can be seen that the port defences of France will be strengthened a good deal, as from twenty-five to thirty first-class torpedo-boats will be completed by this time next year. It is proposed too that to each section of the coast of France an enlarged destroyer of 300 or 400 tons should accompany each flotilla. Two 303-ton destroyers, the *Framee* and *Yatagan*, have been ordered at the Chantiers de la Loire, similar vessels to the *Pique* and *Epee*, under construction at La Seyne.

Sheerness Dockyard.

The departure from here of Admiral and Lady Nicholson

will be amid feelings of regret from the highest to the lowest. He has always taken the greatest interest in the affairs of the port. His naval career has been practically bound up with Sheerness. Work here goes on smoothly. The launch of the *Pomone* was prepared for some time ago. She is a sister ship to the *Pelorus* and has been eleven months building. Another cruiser of the same class, the *Proserpine*, will shortly be completed, but work on her seems to drag along somewhat slowly, and it will be quite two years from the time of her laying down to her first steam trial. The sloop *Dolphin* will also be ready for sea soon to take her place as a training ship for boys. The destroyer *Janus*, which has been in hand here for some considerable time, is now ready for service once more. The *Haughty*, however, will not be ready for some time. The effect of the engineering dispute has been to prevent some overcrowding of the steam basin, which might have resulted had not the dispute arisen, in which case it is extremely probable that the *Perseus*, *Prometheus*, *Pomone*, and *Proserpine* would all have been lying in the steam basin together. The refit of the *Dolphin* means that either the *Acorn* or *Buzzard* will have their refit postponed until the New Year. The latter vessel is as yet in commission, but she will be relieved by the *Alert*, and will be able to reach home about the beginning of January. The *Wye*, storeship, has received her annual refit, and has left here to resume her duties.

The Trials of the "Powerful."

The steaming programme of H.M.S. *Powerful, en route* to China, have afforded an excellent opportunity for ascertaining the capacity of the cruiser for keeping the sea for a length of time, while steaming at the full power of her engines and boilers. From 12 to 13 knots will be her speed from the Cape to Singapore, but from Singapore to Hong Kong, a distance of about 1,450 miles, her machinery will be running at as near full power as possible, and she will make an effort to do the journey in at an average speed of over 20 knots. She will doubtless carry only as much coal as was laid down for her designed draught, as her speed would be considerably lessened by her increased depth in the water if her full coal capacity was utilised. Of course she will be able to make the best progress at the depth of her designed draught, in which case she will be able to carry 1,500 tons of coal. The result of the trip from Singapore to Hong Kong will be awaited here with a very considerable amount of interest, especially the amount of coal she consumes each day. It is supposed that for the continuous journey of 1,450 miles she will develop about 23,000 I.H.P. Taking her second 30-hour coal consumption trial as a criterion it is estimated that the quantity of fuel she will use will be 1·83lb. per I.H.P., or 41.175 lbs. for 22,000 I.H.P., that is, 1,470 tons for the three days' run. The quantity of coal she carries at her designed draught is 1,500 tons, and even supposing she uses 2 lbs. per I.H.P. per hour, she need only carry an extra hundred tons, so that the increase in her designed draught need not be much.

Pembroke Dockyard.

Work at this yard is fairly plentiful and is running in its normal course. The *Andromeda* and *Spartiate* are receiving their due amount of attention and all the men employed on the latter vessel are working overtime. The upper portion of the *Spartiate's* hull is being proceeded with as fast as possible in order that the protective deck may be got on with. The water-tube boilers of the *Andromeda* are also all on board, and no time is being lost on fitting them up. The construction of the Royal yacht proceeds apace and materials of all kinds for her are constantly arriving. She has not as yet been laid down, but the frames will shortly be put in hand and then removed to the slip when everything is ready. In this way she is getting something in hand and will make an apparent good show in a short time She is to be sheathed with wood and will have double bottoms for a portion of her length. She will also have two platforms, and an orlop, lower, main, upper and forecastle decks.

Conversazione.—The Institute of Marine Engineers' conversazione will be held (as mentioned in our last issue) on Friday, December 3rd, at the Town Hall, Stratford. The Presidental address by J, Fortescue Flannery, Esq., M.P., J.P. M.Inst.C.E., will be on "Some Successive Steps in the past progress of Marine Engineering," "Its Existing Condition," and "Some Possibilities of the Future."

METCALFE'S SPEED INDICATOR.

A WANT has been felt for some time in the Royal Navy for some means whereby the rate of revolution of the engines can be ascertained with certainty by momentary observation. It is well known that in the Navy it is customary for a ship or a squadron to be navigated by regulating the progress of each ship by a specific order as to the number of revolutions the engines of each particular ship are to run, and unless such rate of revolution can be given by the engineers in charge with certainty and continuity, the ship is liable to have grave errors in position when manœuvring as a unit in a squadron.

An instrument called the Metcalfe's Patent Speed Indicator has been placed upon the market by Messrs. Elliott Brothers, of Charing Cross, London, which appears to be capable of giving the required indications necessary to enable the engineer to maintain his engines at any predetermined rate of revolution desirable within their range.

In the illustrations of the instrument, which we give herewith, the general construction and arrangement of details is very clearly shown, and by aid of the following description the working of the device will be readily understood:—

Broadly, the instrument is designed for the purpose of showing whether any revolving shaft is running at a desired speed, and to indicate at once if the speed be increased or diminished.

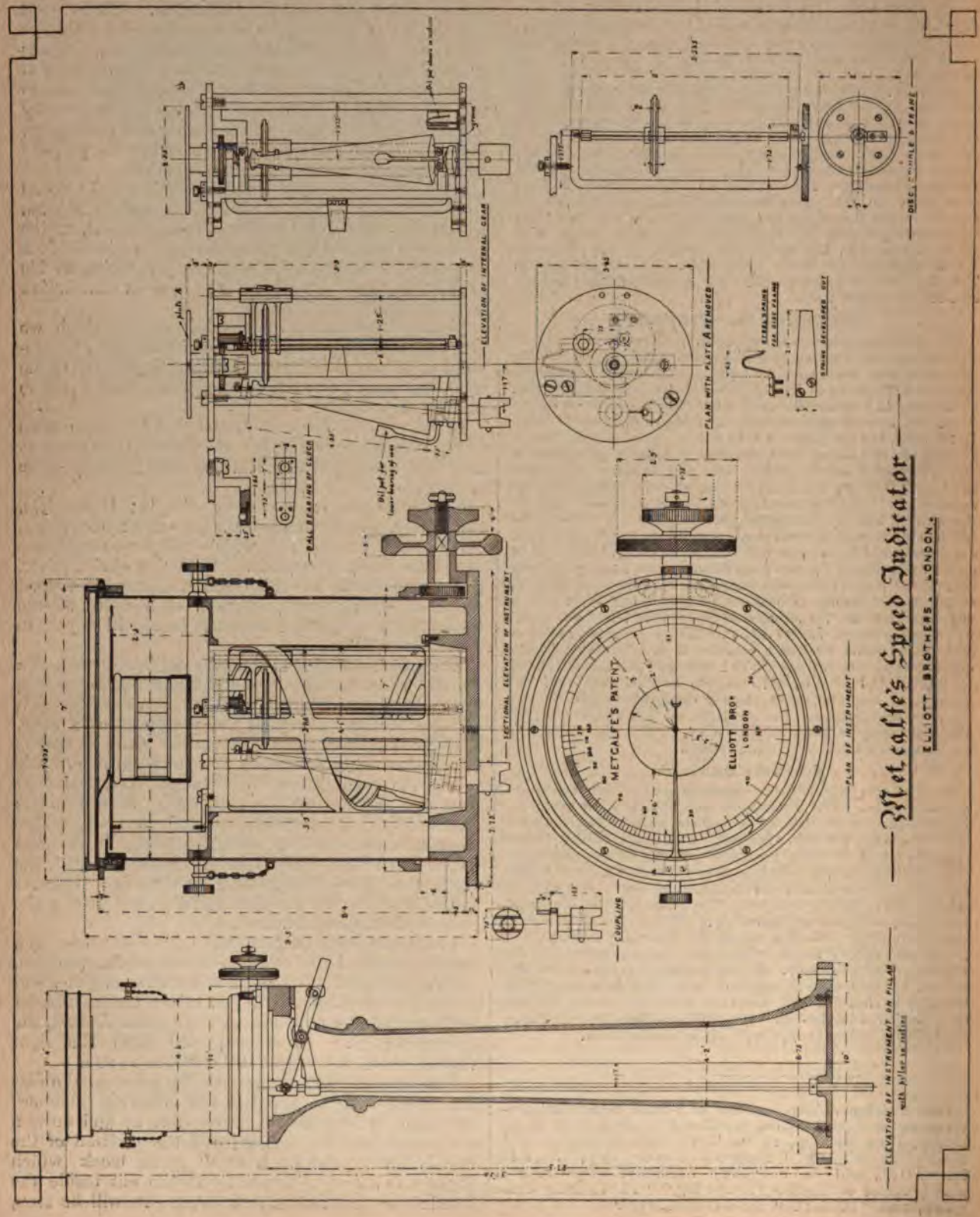
The principle is extremely simple; it consists, essentially, of a small ordinary clock movement carrying one single hand which makes one complete revolution in sixty seconds. It will be obvious that, if the case containing this clock movement is turned round in an opposite direction at a speed of one revolution per minute, this centre hand will appear to stand quite still.

The case containing this movement is mounted on a vertical axle, carried on a light ball bearing, and is driven by means of the friction between the edge of a suitable friction disc and the periphery of a cone. This arrangement admits of various ratios of speeds being obtained between the cone and the disc. The cone is, in turn, driven by means of a vertical shaft from the rotating part, whose speed of rotation is required to be measured. In the case of marine engines, some light bevel gearing arranged in the most convenient manner to suit the particular requirements of various types of engines, is fixed so as to connect the main shaft with the light vertical shaft driving the cone in the instrument itself.

The instrument is mounted on a light cast-iron column which can be readily secured to some position, such as the starting platform of a marine engine; and at the top of the column, just below the instrument itself, a clutch is provided, so that when desired, the instrument may be disconnected from the light vertical shaft, which will still continue to run.

The correct ratio of the gearing between the disc and the cone is obtained in the following manner: the disc is capable of movement up and down a shaft with which it rotates; and the position of the disc is determined by a small guide block which engages in a quick pitch screw thread cut inside the framing of the instrument itself. It will be seen,

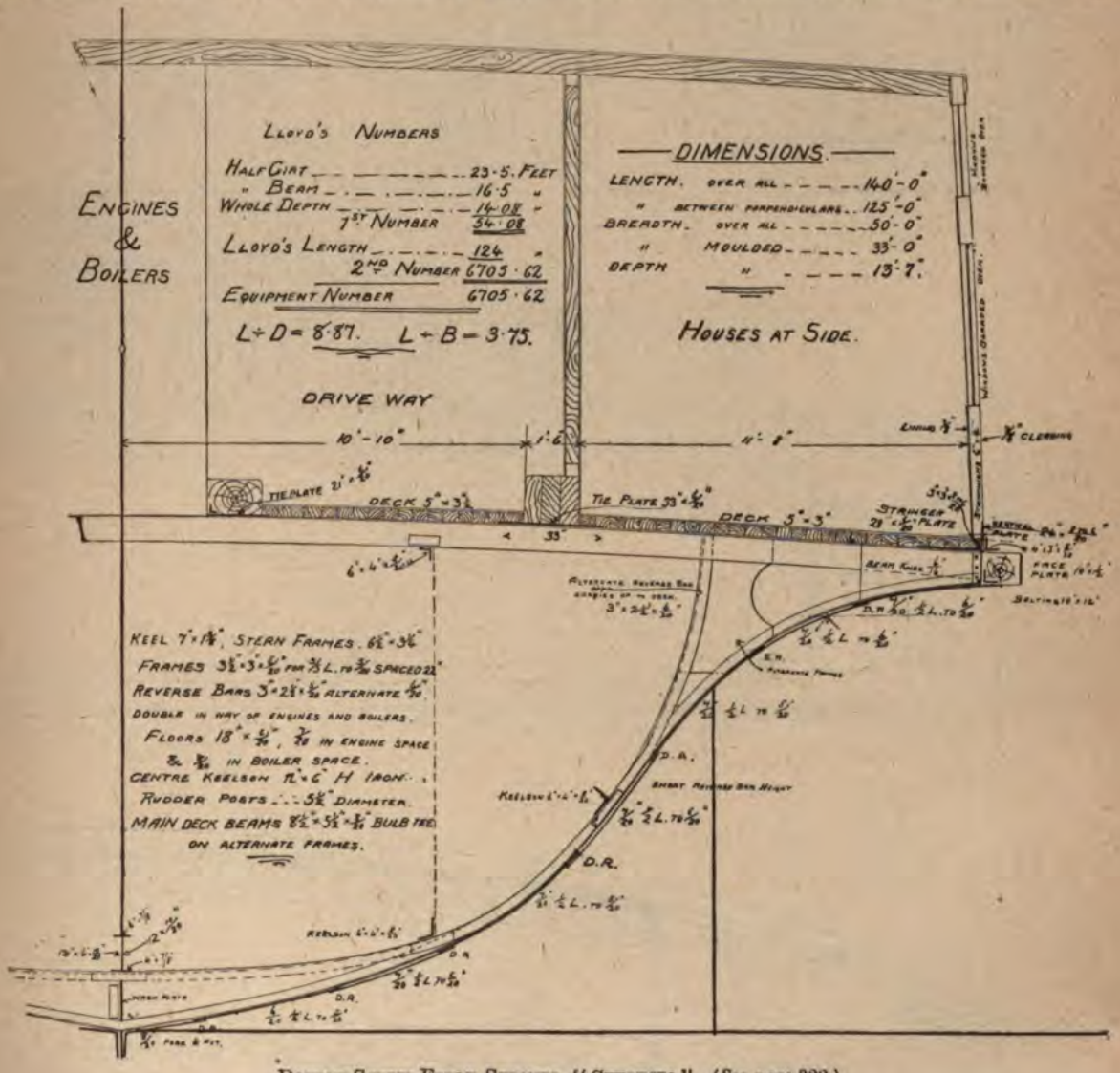
therefore, that, turning this frame round has the effect of raising and lowering the disc in reference to the cone, and of thus altering the ratio of gearing. This turning movement is effected by means of a milled head which engages in a circular rack cut around the lower edge of the outer case of the instrument, and this milled head is provided with a locking nut to clamp it when the case is in the



desired position. Assuming that it is required to run an engine at, say, 43 revolutions per minute, this clamp screw is first released, and then the case is revolved round until the short pointer which travels round the outside of the dial stands at fig. 43. The illustration shows the pointer in this position. The clamp nut should then be screwed up, and the longer pointer which is fitted to the outside ring at the top of the case, should be turned so as to stand pointer and the central pointer on the clock.

The clock is arranged to go for eight days; and to wind it, the two milled headed screws, shown about three-quarters of the way up the sides of the case, should be unscrewed; then the whole case can be bodily lifted off and the clock got at very readily.

A small oil cup, shown in the illustration, should be filled from time to time to keep the bearings at the bottom of the cone duly oiled: Care should be taken


ENGINES & BOILERS
LLOYD'S NUMBERS
HALF GIRT ..... 23·5. FEET
" BEAM ..... 16·5 "
WHOLE DEPTH ..... 14·08 "
1ST NUMBER 34·08
LLOYD'S LENGTH ..... 124 "
2ND NUMBER 6705·62
EQUIPMENT NUMBER 6705·62
L÷D = 8·87. L÷B = 3·75.
DIMENSIONS
LENGTH, OVER ALL ..... 140'-0"
" BETWEEN PERPENDICULARS .. 125'-0"
BREADTH, OVER ALL ..... 50'-0"
" MOULDED ..... 33'-0"
DEPTH " ..... 13'-7"
HOUSES AT SIDE.
DRIVE WAY
10'-10"
4'-8"
TIE PLATE
DECK 5" × 3½"
33"
KEEL 7" × 1⅛", STERN FRAMES 6½" × 3½"
FRAMES 3½" × 3" × ⅜" FOR ⅜ L. TO 3⅜ SPACED 22"
REVERSE BARS 3" × 2½" × ⅜" ALTERNATE ⅝"
DOUBLE IN WAY OF ENGINES AND BOILERS.
FLOORS 18" × ⅜", ⅞ IN ENGINE SPACE & ⅝ IN BOILER SPACE.
CENTRE KEELSON 11" × 6" H IRON.
RUDDER POSTS ... 5½" DIAMETER.
MAIN DECK BEAMS 8½" × 3½" × ⅝" BULB TEE ON ALTERNATE FRAMES.
KEELSON
D.R.

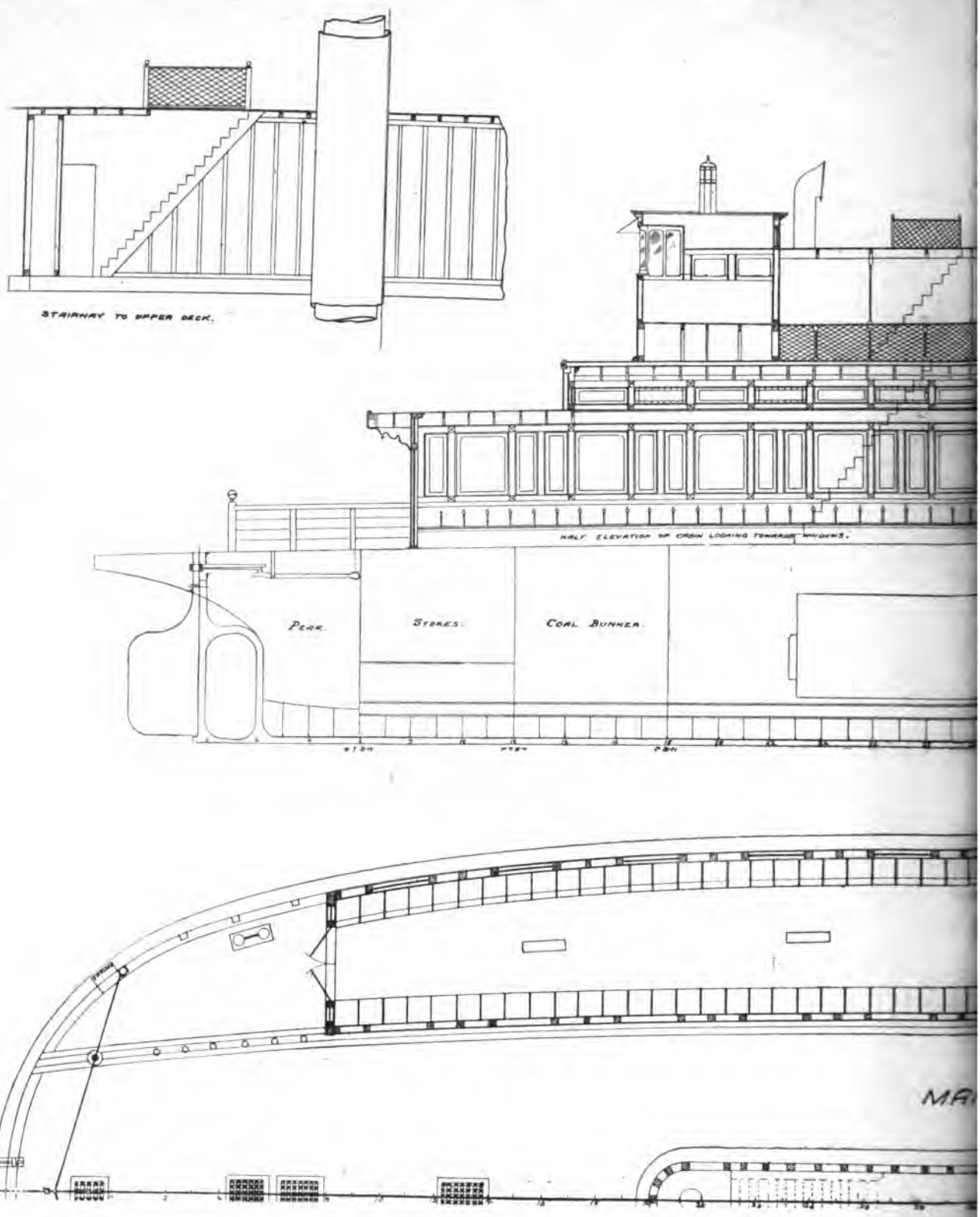
DOUBLE-SCREW FERRY STEAMER "CHEBUCTO." (See page 322.)

opposite the central hand of the clock in whatever position it may be. Should the speed of rotation of the main shaft of the engine be 43, then these two pointers will continue opposite one another exactly in line; any variation of speed of the main engine being shown by deviation to the right or to the left of these pointers. The longer pointer which is screwed to the top ring is only provided as an index hand, as it is more convenient to see whether the speed is right by two pointers which almost touch, than by observing any relative movement between the short

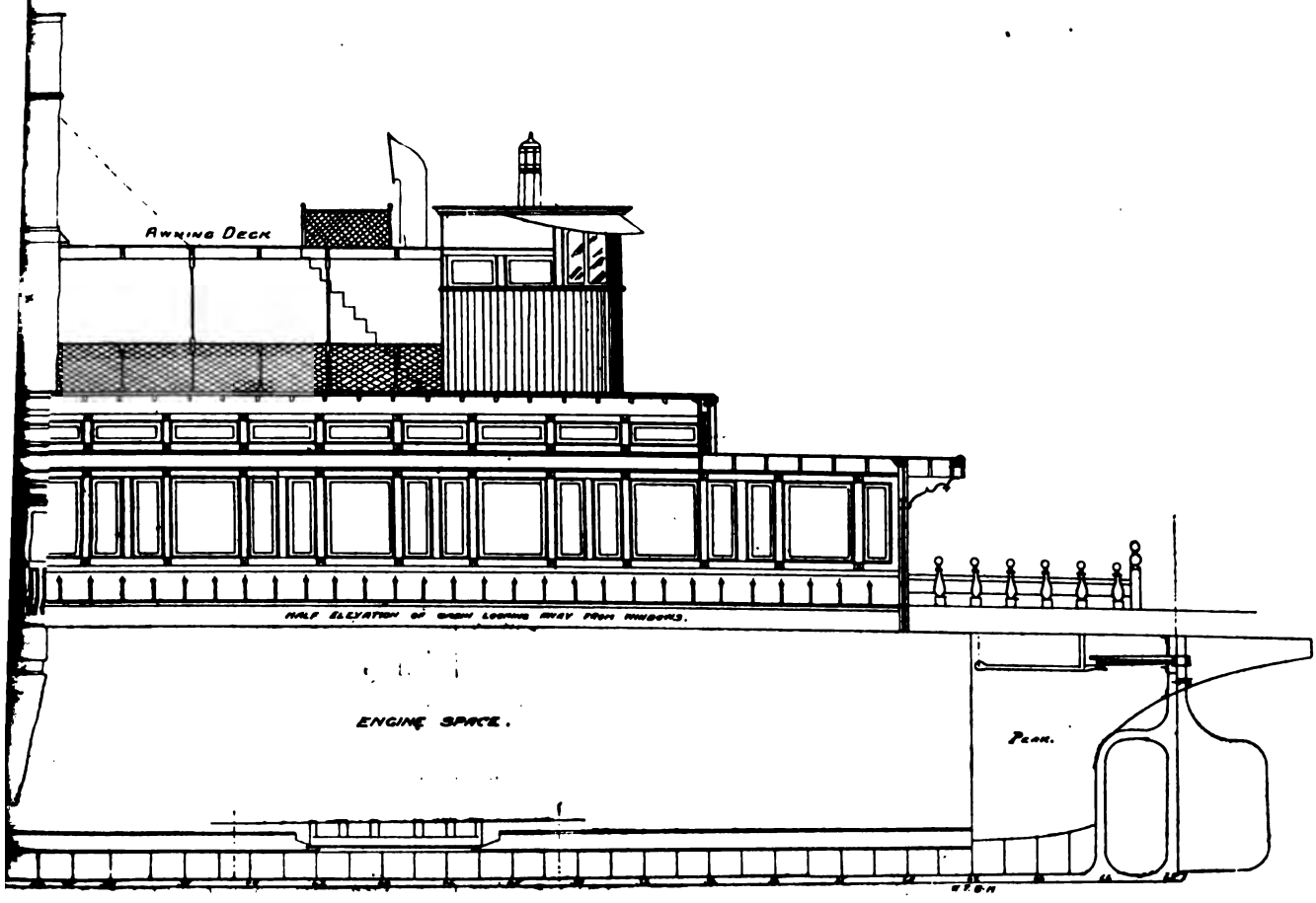
that no oil is allowed to get on to the disc which bears against the cone.

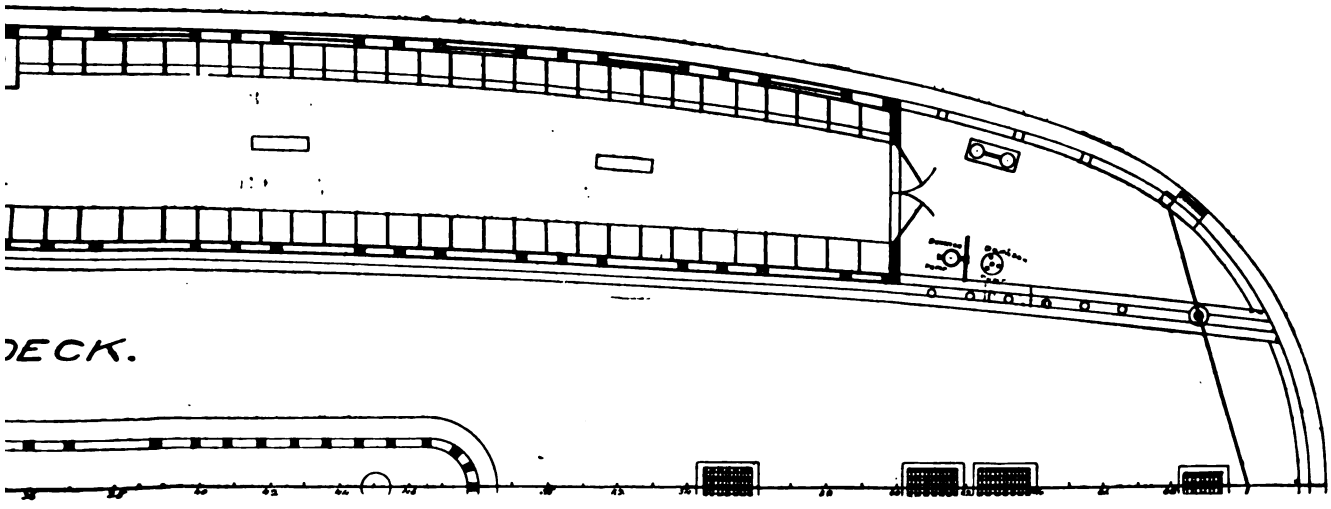
The dial illustrated shows a range of from 20 to 120 revolutions, but by suitably altering the gearing inside the instrument, other ranges can be obtained as desired.

Besides the Royal Navy, there are many other cases where this simple and ingenious instrument will prove a useful and important addition to the complement of scientific apparatus for the carrying out of mechanical functions in a reliable and correct manner.



DOUBLE-SCREW FERRY STEA





DECK.

REBUCTO." (See page 322.)

NAVAL EXPENDITURE AND MERCANTILE MARINE.

THE following Return has lately been issued as a Parliamentary Paper, showing aggregate naval expenditure on seagoing force; aggregate revenue; aggregate tonnage of Mercantile Marine; annual clearances of shipping in the foreign trade; annual clearances of shipping in the coasting trade; annual value of imports by sea, including bullion and specie and transhipment trade; and annual value of exports by sea, including bullion and specie and transhipment trade, of various countries, including British self-governing Colonies, for the year 1896. Where it has not been possible to give the particulars for 1896, the figures for the latest year available have been shown:—

Countries.	Aggregate Naval Expenditure on Seagoing Force	Aggregate Revenue.	Aggregate Tonnage of Mercantile Marine.	Annual Clearances of Shipping in the Foreign Trade.	Annual Clearances of Shipping in the Coasting Trade.	Annual Value of Imports by Sea, including Bullion and Specie & Transhipment Trade. ††	Annual Value of Exports by Sea, including Bullion and Specie & Transhipment Trade. ††
BRITISH EMPIRE:	£	£	Tons.	Tons.	Tons.	£	£
United Kingdom ...	21,264,377 (*a) (1895-96)	101,974,000 (Year ended March 31, 1896)	9,020,282† (1896)	42,984,963 (1896)	48,610,092* (1896)	480,607,000 (1896)	341,551,000 (1896)
India	312,844 (*b) (*c)	55,907,045(*d) (Year ended	46,735(*e) (1896)	4,098,561 (‖a) (Year ended	13,356,084(‖a) (Year ended	49,049,860 (Year ended	67,401,265 (Year ended
SELF-GOVERNING COLONIES:§	(1895-96)	March 31, 1896)		March 31, 1896)	March 31, 1896)	March 31, 1896)	March 31, 1896)
Australasian; ‡							
New South Wales	47,026 (1895-96)	9,237,585 (Year ended June 30, 1896)	112,634 (1896)	2,930,280 (1895)	No Returns	14,209,047‡‡ (1895)	17,186,656‡‡ (1895)
Victoria	70,499 (1895-96)	6,696,264 (Year ended June 30, 1895)	95,760 (1896)	2,167,147 (1895)	Cannot be given	11,526,530§§ (1895)	15,323,031§§ (1895)
South Australia (except Northern Territory)	16,656 (1895-96)	2,455,510 (1895)	51,580 (1896)	1,496,203 (1895)	No Returns	3,916,840 (1895)	6,558,339 (1895)
Northern Territory		63,959 (Year ended June 30, 1895)	132 (1896)	85,515 (1895)	No Returns	95,279 (1895)	175,704 (1895)
Western Australia	2,490 (1895-96)	1,125,941 (Year ended June 30, 1895)	8,113 (1896)	764,185 (1895)	No Returns	3,774,951 (1895)	1,332,554 (1895)
Tasmania ...	4,776 (1895-96)	761,971 (1895)	16,535 (1896)	473,546 (1895)	No Returns	1,094,457 (1895)	1,373,063 (1895)
New Zealand ...	20,813 (1895-96)	4,410,615 (Year ended March 31, 1896)	76,556 (1896)	648,946 (1895)	4,858,976 (1895)	6,400,129 (1895)	8,550,224 (1895)
Queensland ...	20,101 (1895-96)	3,413,172 (Year ended June 30, 1895)	22,970 (1896)	502,195 (1895)	2,940,558** (1895)	4,832,827 (1895)	8,285,808 (1895)
African:							
Natal	—	1,169,780 (Year ended June 30, 1895)	2,725 (1896)	1,063,797 (1896)	No Returns	2,466,415 ‖ ‖ (Year ended June 30, 1895)	1,305,184*** (Year ended) June 30, 1895)
Cape of Good Hope	—	6,680,423 (Year ended June 30, 1896)	1,963 (1896)	2,437,479 (1896)	3,575,138 (1896)	18,682,455¶¶ (1896)	16,970,168*** (1896)
American;							
Dominion of Canada ...	—	7,524,368 (Year ended June 30, 1896)	765,344‖ (1896)	5,563,464¶ (Year ended June 30, 1896)	13,381,837¶ (Year ended June 30, 1896)	22,723,455††† (Year ended June 30, 1896)	24,865,860‡‡‡ (Year ended June 30, 1896)
Newfoundland ...	—	325,721 (1895)	104,189 (1896)	407,100 (1894)	No Returns	1,250,361 (1895)	1,295,831 (1895)

REMARKS.

* Exclusive of the tonnage of vessels that cleared in ballast from London.

(*a) Of this total £20,543,278 was ordinary expenditure, and £721,099 was expenditure under the Naval Works Act, 1895 (outside Navy Votes).

(*b) Expenditure in India converted into sterling at the official rate for the year of 1s. 1½d. the rupee.

(*c) Includes a contribution of £117,000 for Her Majesty's ships in Indian Waters, and £59,600 for Her Majesty's ships and vessels for the Naval Defence of India. The balance represents expenditure on the Royal Indian Marine. The question as regards the contribution on account of Her Majesty's ships in Indian Waters is now settled, and the payment on account of this service will be £100,000 annually until 1900-1.

(*d) Converted at the rate of 1s. 1·64d. to the rupee. The Revenue stated for the year ended March 31st, 1896, is apparently smaller than that for the year ended March 31st, 1894. This is not, however, practically the case, the difference arising from the rate of conversion, which, in the year 1894, was taken at the rate of 1s. 4d., and in the year 1896 at 1s. 1·64d. to the rupee.

(*e) In addition to the vessels registered under the Imperial Act of 1894, India owns some vessels of small tonnage registered under the Indian Act X. of 1841. Exclusive of the tonnage of vessels below 100 tons.

† Including the Isle of Man and Channel Islands.

‡ Includes contributions towards the maintenance of Her

Majesty's vessels, for protection of floating trade in Australasian Waters, as follows, for 1895-6:—

New South Wales	£37,961
Victoria	36,406
South Australia	10,690
Western Australia	2,490
Tasmania	4,776
New Zealand	20,813
Queensland	13,503
Total ...	£126,639

The annual contribution is £126,000, payable in advance. It was apportioned amongst the various colonies on a population basis for the year commencing March 1, 1897, as follows:—

New South Wales	£37,820
Victoria	34,243
South Australia	10,499
Western Australia	4,021
Tasmania...	4,841
New Zealand	20,814
Queensland	13,762
Total ...	£126,000

§ As regards the revenues of these colonies, it should be observed that they are exclusive of loans raised.

‖ Including vessels registered under the 41 C. of the Consolidated Statutes of Canada for Inland Navigation only.

(‖ a) Including native craft.

¶ Exclusive of the tonnage of vessels (5,088,389 tons) trading on the rivers and lakes between Canada and the United States.

** Inclusive of the tonnage of vessels (2,321,492 tons) engaged in coasting voyages terminating beyond the Colony.

†† As a rule there are no separate returns of the transhipment trade in the British colonies, but, wherever possible, the value of such trade has been included in the figures given.

‡‡ Exclusive of transhipments, the value of which is not known.

§§ Including transhipments, valued at £1,249,360. The returns of transhipment are incomplete.

‖ ‖ Including the value of goods imported in transit for the interior.

¶¶ Including the value of goods entered for removal to places outside the Customs Union.

*** Including the value of gold, the produce of South African States, brought into the colony overland, and exported by sea.

††† Total imports for home consumption. Imports by sea are not separately shown in the Canadian returns.

‡‡‡ Total exports. Exports by sea are not separately shown in the Canadian returns.

NOTE.—The above particulars, with the exception of those for naval expenditure, which have been furnished by the Admiralty, have been extracted either from Board of Trade returns or from the official returns of the various colonies in the possession of the Board of Trade.

REMARKS.

NOTE.—With regard to the revenue of foreign countries, in converting the foreign currencies into £'s sterling the par value of the foreign money has been taken, except in the case of Japan [see (a 1], and in that of Chili [see note (w)]; as also in that of Argentine, where the paper pesos have been converted into their equivalent in gold.

The particulars given for the imports and exports of foreign countries by sea are usually exclusive of transhipment trade.

(a) Budget Estimates.

(a I) Exclusive of receipts from loans and Treasury notes.

(a II) Calculated on the value of the yen in 1895.

Countries.	Aggregate Naval Expenditure on Sea-going Force.	Aggregate Revenue.	Aggregate Tonnage of Mercantile Marine.	Annual Clearances of Shipping in the Foreign Trade	Annual Clearances of Shipping in the Coasting Trade.	Annual Value of Imports by Sea, including Bullion and Specie and Transhipment Trade.	Annual Value of Exports by Sea, including Bullion and Specie and Transhipment Trade.
	£	£	Tons.	Tons.	Tons.	£	£
France	10,877,279 (1896)	138,333,000 (1894)	887,078 (1895)	14,130,294 (1895)	6,648,304 (1895)	139,232,000 (d) (1896)	125,472,000 (d) (1896)
Russian Empire ...	5,835,052 (1896)	139,743,000 (1895)	—	9,789,044 (1894)	12,091,194 (1894)	28,900,000 (d) (t) (x) (1894)	43,998,000 (d) (t) (x) (1894)
Germany	4,372,068 (1896)	62,394,000 (a) (1896-7)	1,502,044 (1895)	12,031,937 (1895)	3,253,590 (1895)	221,650,000 (b) (d) (1895)	183,115,000 (b) (d) (1895)
Italy	4,129,984 (1896)	71,804,000 (1896)	776,077 (1895)	8,614,283 (1896)	18,063,669 (cI) (1896)	33,418,000 (c) (1895)	21,023,000 (c) (1895)
Spain	937,742 (1896)	30,951,000 (a) (v) (1896-7)	719,572 (1895)	12,920,316 (1895)	11,605,837 (1894)	26,368,000 (1895)	27,956,000 (1895)
Austrian-Hungary	1,122,369 (1896)	Austria, 53,710,000 (a) (1895) Hungary. 44,259,000 (1895)	200,080 (1894)	9,151,071 (e) (1894)	See note (e)	12,473,000 (t) (1895)	8,083,000 (t) (1895)
Netherlands ...	1,313,169 (1896)	9,980,000 (a) (1896)	290,657 (1895)	6,758,218 (1895)	—	Tons. 7,895,000 (s) (1895)	Tons. 1,839,000 (s) (1895)
Portugal	649,944 (1896)	11,182,000 (a) (Year ended 30th June, 1897)	—	5,903,594 (1894)	1,263,916 (q) (1894)	£ 11,466,000 (b) (d) (f) (1895)	£ 8,563,000 (b) (f) (1895)
United States (year ended June 30)	6,180,132 (1896)	85,307,000 (a I) (1896)	844,954 (g) (1896)	17,818,790 (h) (1896)	—	161,290,000 (d) (1896)	171,141,000 (d) (1896)
China	Cannot be given	—	49,307 (k) (1895)	4,711,252 (1896)	12,055,441 (l) (1896)	35,271,000 (d) (1896)	23,352,000 (d) (m) (1896)
Japan	5,945,919 (1896)	9,508,000 (a) (aII) (1895-6)	254,692 (n) (1895)	2,419,181 (1895)	—	14,619,000 (d) (1895)	14,356,000 (d) (1895)
Chili	Cannot be given	4,422,000 (w) (1894)	—	3,038,847 (1895)	5,658,584 (1895)	16,445,000 (d) (1895)	15,884,000 (d) (p) (1895)
Brazil	1,053,486 (1896)	39,896,000 (a) (v) (1896)	—	—	—	—	—
Argentine Republic	822,435 (y) (1896)	7,641,000 (1895)	86,090 (1893)	7,014,352 (1895)	—	19,006,000 (c) (r) (t) (1895)	23,284,000 (c) (r) (t (1895)

(b) Total trade. Imports and exports by sea are not separately distinguished in the respective trade volumes.
(c) Including silver bullion only.
(c 1) "Navigazione di Cabotaggio e di Scalo."
(d) Excluding bullion and specie.
(e) Including coasting trade, exclusive of Hungary.
(f) These figures are stated to be provisional only, and subject to rectification.
(g) Registered for over-sea (*i.e.*, foreign) trade only.
(h) Exclusive of the vessels engaged in the lake trade between the United States and Canada, the tonnage of which amounted to 3,595,795 tons.
(k) Vessels of foreign (*i.e.*, non-Chinese) type only, belonging to Chinese owners and sailing under the Chinese flag.
(l) Coasting trade between the treaty ports of China.
(m) Including tea carried overland from Tientsiu to Russia, *via* Kiakhta.
(n) Vessels of foreign type only, excluding junks.
(p) Total exports. Exports by sea not separately distinguished in the Chilian trade volume.
(q) Portuguese vessels only.
(r) By sea and river.
(s) Metric tons of 2,204 lbs. The particulars as to value of trade by sea are not available from the Dutch trade volumes.
(t) Special trade—*i.e.*, imports for home consumption or exports of domestic produce and manufacture, as the case may be.
(v) From the "Almanach de Gotha" for 1897.
(w) From the "Almanach de Gotha" for 1894 and 1895, the figures being 59,903,422 paper pesos (at 1s.) and £1,426,335 sterling.
(x) Trade by European frontier and with Finland.
(y) This sum is stated to be not sufficiently authenticated.

NOTE.—The above particulars, with the exception of those for Naval expenditure, which have been furnished by the Admiralty, have been extracted either from Board of Trade returns or from the official returns of the various countries in the possession of the Board of Trade, except in the cases mentioned (see notes v and w).

MANCHESTER SHIP CANAL.

AT the ordinary meeting of the Institution of Civil Engineers, on Tuesday, November 9th, Sir John Wolfe Barry, K.C.B., F.R.S., the President, in the chair, four papers, by Sir E. Leader Williams, M.Inst.C.E., Mr. Whately Eliot, M.Inst.C.E., and Mr. W. O. E. Meade-King, M.Inst.C.E., dealing with the construction and working of the Manchester Ship Canal, were read.

The first paper gave an historical account of the undertaking, with a general description of its construction and equipment. As early as 1721 the necessity for providing efficient water communication between Manchester and Liverpool had been recognized, and many schemes had since that time been propounded. The first company proposing to construct a ship-canal to Manchester had been formed in 1825, with Mr. Telford, past-President Inst.C.E., and Sir John Rennie, past-President Inst.C.E., as consulting engineers. Docks were to be constructed at Dawpool, on the River Dee, for large vessels, the cargoes being lightered to Manchester, smaller vessels passing to Manchester, a distance of 51 miles. The depth of the canal was to be 15 ft., and the locks 110 ft. by 28 ft. In 1838, Sir John Rennie reported in favour of a ship-canal from Warrington to Runcorn; and in 1840, Mr. Henry R. Palmer, Vice-President Inst.C.E., made a report to the Mersey and Irwell Navigation Co. on the improvement of their navigation, so as to adapt it for sea-going vessels. No action had, however, been taken on these reports, and it was not until 1882 that the question was revived. On the 27th June of that year, a meeting of seventy leading merchants and manufacturers was held at the house of Mr. Daniel Adamson, when a provisional committee was formed, and the author and the late Mr. H. H. Fulton were instructed to make surveys and report on the "feasibility of constructing a navigation to Manchester available for ocean-going vessels." The late Mr. James Abernethy, past-President Inst.C.E., was retained as consulting engineer. The author reported in favour of a canal with locks above Warrington, utilizing the waters of the Mersey and Irwell, with large sluices to pass off floods. The bottom width of the canal was to be 100 ft., to allow of vessels passing at any point, but this width was afterwards increased to 120 ft. The depth was to be 26 ft. The provisional committee resolved to take action upon this report, and to make application to Parliament for powers to carry out the work. In 1885 the Ship Canal Bill was obtained, the plan being modified to meet the strong opposition to training walls in the Mersey, by substituting a semi-tidal canal along the Cheshire side of the estuary, commencing at Eastham, about six miles above Liverpool.

The canal commenced at Eastham locks, which maintained the level at a depth of 26 ft., subject to increase on all tides which rise above 14 ft. 2 in. on the old dock-sill datum at Liverpool. The lower sill of the largest lock was 23 ft. below old dock-sill, Liverpool, or 42 ft. below high water ordinary spring tides; the upper sill was 28 ft. below the ordinary water-level of the canal. A channel had been dredged below the locks to deep water, giving 6 ft. at low water spring tides, and 33 ft. at high water. At neap tides there was 13 ft. at low water, and 26 ft. at high water. Between this point and Runcorn the canal followed the south bank of the estuary, being carried by embankments across the bays. It then passed inland to Latchford locks, in an almost straight course, where the tidal action ended. Thence a straight cutting, three miles long, connected the tidal portion of the canal with the River Mersey, which, from this point to its confluence with the River Irwell, was absorbed in the more direct course of the canal. The water level was here nearly on a level with the adjoining land, which had been embanked with the spoil from the cutting; the drainage on the north side of the canal passing into the Mersey as heretofore, a 5 ft. siphon under the canal providing for land drainage on the other side. The upper portion of the canal passed, in cutting 30 ft. or 40 ft. deep, through the valleys of the Mersey and Irwell, which, with their tributary streams, supplied it with water between Manchester and Latchford locks; even in the long drought of 1896 there was ample supply of water for lockage purposes. Floods in the canal were dealt with by Stoney sluices constructed parallel to the locks; they were each 30 ft. wide. At Mode Wheel and Barton there are four sluices each, at Irlam five, and at Latchford three. The minimum width at the bottom of the canal was 120 ft., which enabled large vessels to pass each other at any point. The railway viaducts and the bridges afforded the same width of waterway, except at Runcorn Viaduct, which was 92 ft., and Barton Aqueduct, 90 ft. The swing bridge at Salford, which was above the largest docks, gave 75 ft. width of waterway. There were locks at Irlam, 7¼ miles from Latchford, at Barton, two miles higher, and at Mode Wheel, 3½ miles above Barton. The Manchester Docks commenced at these locks, but the bottom width of the canal for three miles below them had been increased from 120 ft. to 170 ft., to enable vessels to lie and discharge cargoes without interfering with the passage of traffic on the canal. The total rise on the canal above the ordinary water-level below Latchford locks was 60 ft. 6 in., giving an average of about 15 ft. for each set of locks. The length of the canal to its termination is 35½ miles. The excavation had amounted to about 54 million cubic yards, including 12 million cubic yards of sandstone rock. The expenditure of the company to the 1st January, 1897, had been £15,163,795 15s. 11d., and the traffic had increased from 925,659 tons in 1894 to 1,826,237 tons in 1896.

The construction of the Eastham and Runcorn divisions of the canal, where it was found necessary to take the line across the bays by embankments between the canal and the estuary, was described in succeeding papers. Exceptional difficulties had been encountered with portions of the Pool Hall Bay embankment. At one point the line crossed the bed of an old stream filled with mud, and when the rubble bank, forming the toe of the outer slope, had reached a height of 20 ft., it slipped forward, carrying the clay hearting with it. Sheet piling at the back of the toe and between the rubble and the clay had therefore to be resorted to. At another point the work had to be stopped for some months at a level which allowed the embankment to be completely submerged at every tide. When tipping re-commenced, the soft clay was forced out above the tops of the rubble banks on each side, and the clay had to be cut back on the slopes and replaced with rubble. An account was also given of the use of the high-pressure water-jet in pile-driving through the sand, which had been adopted with much success at Ellesmere Port Bay. The last paper presented a description of the Irlam Division, where the nature of the work was rendered difficult by the frequent crossings of the Rivers Mersey and Irwell.

The papers were illustrated by cartoons and by lantern views of the leading features of the canal during and after construction.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from October 25th to November 23rd, 1897:—

Allden, Frank A., engineer to the *Katoomba*, to date November 15th.

Baker, John G. L., staff engineer to the *Katoomba*, to date November 4th.

Barber, James H., engineer to the *Ringdove*, to date November 9th.

Barnett, H. S., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Bench, George E., staff engineer to the *Magicienne*, to date November 2nd.

Bills, Walter W., assistant engineer to the *Medusa*, to date November 9th.

Blakeman, Mark, chief engineer to the *Thetis*, to date November 4th.

Cox, Frank S., assistant engineer to the *Fearless*, to date November 9th.

Dawson, J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Dewhurst, Charles, assistant engineer to the *Thrush*, to date December 1st.

Donovan, William A., assistant engineer to the *Royal Arthur*, to date November 4th.

Garrard, Charles E. (probationary), assistant engineer to the *Repulse*, to date October 29th.

Goodwin, Frank R., assistant engineer (temporary) to the *Leda*, to date November 9th.

Guyer, Frank, assistant engineer to the *Sirius*, to date November 9th.

Hall, Frederick M. (probationary), assistant engineer to the *Venus*, to date November 9th.

Haste, Frederick C., assistant engineer (temporary) to the *Benbow*, to date November 9th.

Hastings, A. J. (probationary), assistant engineer to the *Royal Arthur*, to date November 4th.

Hillier, Percy C. A., assistant engineer to the *Barfleur*, to date November 15th.

Howe, Percival C. W., assistant engineer to the *Hibernia*, to date November 15th.

Howes, Harold G. T. (probationary), assistant engineer to the *Doris*, to date November 18th.

Hudson, John A. (probationary), assistant engineer to the *Magicienne*, to date November 18th.

Jenkins, J. E., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Johnson, H. J., assistant engineer R.N.R., has been promoted to the rank of engineer.

Laird, George F., fleet engineer to the *Royal Arthur*, to date November 4th.

Lawrence, W. G., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Leader, Herbert J., engineer to the *Alert*, to date November 25th.

Lewis, E. E., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Little, Herbert J., engineer to the *Melampus*, to date November 9th.

Lonnon, W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Mabb, William J., staff engineer to the *Aurora*, to date October 29th.

Mackean, Arthur J., assistant engineer to the *Magnificent*, to date November 18th.

MacQueen, Bernard D. (probationary), assistant engineer to the *Eclipse*, to date November 12th.

Meadus, Henry H., staff engineer to the *Venus*, to date November 9th.

Minhinnick, Percy C., assistant engineer to the *Victory*, additional to date November 30th.

Mogg, William G., chief engineer to the *Sirius*, to date November 9th.

Mowlam, Ernest J., assistant engineer to the *Doris*, to date November 18th.

Nicolson, Gilbert C., engineer to the *Rambler*, undated.

Pascoe, George, engineer to the *Hebe*, undated.

Pearce, Richard H., engineer to the *Magicienne*, to date November 18th.

Rayner, A., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Roskruge, Francis J., assistant engineer (temporary) to the *Circe*, to date December 1st.

Russell, Charles S., engineer to the *Porcupine*, undated.

Ryder, John F., fleet engineer to the *Pembroke*, additional to date November 4th.

Short, Edward A., engineer to the *Sharpshooter*, to date November 15th.

Smith, William A. P., engineer to the *Haughty*, to date November 15th.

Spencer, Arthur P. S., assistant engineer to the *Goldfinch*, to date November 4th.

Spriddle, William P. C., assistant engineer to the *Royal Arthur*, undated.

Steward, Cornelius H., staff engineer to the *Wallaroo*, to date November 4th.

Stribling, William S., fleet engineer to the *Doris*, to date November 18th.

Stuttaford, Frank R., chief engineer to the *Æolus*, to date November 4th.

Sutton, Arthur W., assistant engineer to the *Porpoise*, to date November 30th.

Sutton, Francis J., engineer to the *Venus*, to date November 9th.

Tompkins, Albert E., chief engineer to the *Porpoise*, to date November 30th.

Townsend, Walter E., engineer to the *Doris*, to date November 18th.

Tucker, Joseph N., assistant engineer to the *Katoomba*, to date October 29th.

Turner, Arthur W., chief engineer to the *Gorgon*, to date November 15th.

Vincent, George H., assistant engineer to the *Karrakatta*, to date October 29th.

Ward, John T. H., engineer to the *Boxer*, to date November 9th.

Watson, L. J., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Webster, George P., engineer to the *Gleaner*, to date November 9th.

Westbrook, Walter S., engineer to the *Royal Arthur*, to date November 4th.

Wiggins, William T., chief engineer to the *Furious*, to date November 2nd.

Williams, Walter K., chief engineer to the *Fearless*, undated.

Wilshin, John B., assistant engineer to the *Jason*, to date November 4th.

HOAR & BROWN'S HARDWOOD MARKET REPORT, NOVEMBER 20th, 1897.

TEAK.—Enquiries have been more numerous of late, and the trade appears to be taking an active turn for the better. Prices for good timber keep firm, especially for floating cargoes, and although the landed stock is large, it is mostly controlled by a few holders, who are not likely to give way in prices. The landings for October were considerably larger than those of the corresponding month last year, but the deliveries came up to an equal quantity. The movements for the first three weeks of November are as follows:—

	Timber. Loads.	Planks. Loads.	Blocks. Loads.	Total. Loads.
Stock, Nov. 1st.	10,561	2,507	15	13,083
Landings ..	372	976	—	1,348
	10,933	3,483	15	14,431
Deliveries ..	697	291	—	988
Stock, Nov. 20th.	10,236	3,192	15	13,443

There is still a considerable accumulation of second-class wood, which tends to weaken the market. The outlet for this class is small, except at ruinous rates.

For planks the demand has received a check, and a quiet time is ruling; the stocks are large, and prices have declined slightly.

MAHOGANY.—The position of the market appears a little less firm consequent upon the arrival of increased supplies from Africa. This applies particularly to the minimum classes. Good quality of fair sizes, both in Honduras and Tobasco, is still holding up to advanced figures.

NICARAGUAN.—Prices are fairly firm, and there is a good demand for sound wood.

AFRICAN.—The unusually large supplies which have been arriving lately have weakened prices, and holders of stock are fearing a heavy fall, which will certainly take place at the next few sales, unless the consumers come forward to protect the market. Extra good logs of large size are holding their own against the depression in the ordinary quality and smaller sizes.

ST. DOMINGO.—There is nothing offering in second hands. A cargo just about going for public sale ought to fetch high prices. The same remarks apply to the Cuba market.

CEDAR.—Supplies continue small and prices are firm for Honduras, Cuba, and Tobasco, but with Paraguay there is little or no demand, and the stock is ample. Trinidad has lately been cutting in much below ordinary figures, and the wood appears to be appreciated.

WALNUT.—American logs have changed hands lately at exceedingly low values, and this may be accounted for by the enormous shipments of cut stuff lately arriving. Prime large logs are selling well, especially when sound and fit for the knife. Poor grades of planks and boards are difficult to realise, and first quality parcels have also been growing weaker.

SEQUOIA.—Prices are unaltered, and the stock continues to diminish. Shippers are anxious to make contracts, but buyers on this side do not appear eager to take up cargoes, although very low quotations are made.

WHITEWOOD.—Logs are slow of sale, the heavy stocks of boards and planks causing much uneasiness, and values show a decline.

KAURIE PINE.—There is little enquiry for logs, but planks are selling more freely and prices continue firm.

GREENHEART.—Only business in small quantities at a low figure is doing, and the stock is ample.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

THE hopes and expectations so universally entertained of a conference being arranged between the contending parties in the great engineering struggle have waxed and waned by terms during the month of November, but at last—owing largely to the perseverance and tact evinced by the head officials of the Board of Trade, and to the growing exhaustion and reasonableness of belligerents—a conference has been arranged, and is, at the moment of writing, under progress in London. By the time these lines are published a termination of some kind or another will have to be arranged for, or within sight, to the deplorable deadlock which has not only dislocated the engineering trade for such a length of time, but has to an immense extent hindered and paralysed all the allied branches of industry.

With the prospect of an early settlement of the dispute, the desired improvement should, however, shortly set in, more particularly as there is good reason to believe that many shipbuilding orders now pending will at once be placed.

Although Clyde builders during October turned out the surprisingly large total of 29,250 tons of new shipping, two vessels in themselves—the *Carisbrooke Castle* and the *Umballa*—were responsible for as much as 13,000 tons, while no fewer than 23 of the 37 vessels making up the total were barges, not launched at all, nor fitted with engines, but shipped abroad in pieces. The launches for November are fewer in number, but with the near prospect of a settlement of labour difficulties, quite a rush of vessels to "their native element" will take place, many of which have been "held up" on account of the cessation of operations in the engineering shops.

In the matter of new contracts October was very fruitful considering existing circumstances, altogether about 40,000 tons having been placed. During November the orders have not been so plentiful, but one or two firms have been specially active in booking orders for old-established lines. This has been so in the case of the Caledon Shipbuilding and Engineering Co., Limited, Dundee, as afterwards noted.

The London and Glasgow Shipbuilding Co., Limited, Govan, early in November entered into a contract with the Clyde Shipbuilding Co., Limited, to build and engine two steel screw steamers, each of 4,700 tons, similar to the *Foreland* and *Goodwin*, built some time ago by this firm for the same owners. The hull and engines are to be classed and built under the special supervision of the British Corporation Registry.

Messrs. Robert Napier & Sons, Limited, Govan, whose stocks are already well occupied with important work, have contracted with Messrs. George Thompson & Co., of Aberdeen, to build and engine a large steamer for the cargo and passenger trade of their Aberdeen Line to Australia and South African ports. This and a similar vessel entrusted to Messrs. Hall, Russell & Co., Aberdeen, is considerably larger than the other steamers of the Aberdeen line, the most recently built of which is the *Nineveh*, of 4,000 tons.

Messrs. William Simons & Co., Renfrew, have contracted to build and equip with machinery a sand-pump hopper dredger, of about 400 tons gross, for the New South Wales Government.

Messrs. A. Rodger & Co., Port-Glasgow, have contracted to build for Mr. Hugh Hogarth, Glasgow, a steel spar-decked steamer, of about 3,600 tons gross, the engines for which will be supplied by a Glasgow firm of engineers.

Messrs. Scott & Sons, Bowling, about the end of October booked the order for a steel screw steamer, of about 150 tons gross, for Messrs. I. Monks & Co., Limited, suitable for the coasting trade.

Messrs. The Ailsa Shipbuilding Co., Troon, have contracted to build a steel screw steamer, of 400 tons gross, for Messrs. John Hay & Sons, Glasgow.

Messrs. The Campbelltown Shipbuilding Co. have recently booked orders for two steamers: one of about 2,000 tons, and one of 1,250 tons, the engines for which will be supplied by Glasgow firms.

A 6,000-ton cargo steamer, which has for some time been under construction in one of the Clyde shipyards, has been sold by Messrs. C. H. Rugg & Co., shipbrokers, London, at about £6 per ton.

The delay which has taken place in fixing the contract for the two new paddle steamers for passenger traffic in Loch Lomond—which the two railway companies having joint interest in the traffic—the Caledonian and the North British—are at one in thinking necessary—has been caused by the extent to which the respective marine superintendents for the companies are at variance as to the particular type of vessel best suited to the service. The matter is at present being made the subject of arbitration in Edinburgh, Sir John Cheyne, Q.C., being arbiter. The Caledonian Co. desire steamers of large size, and with machinery in every way up-to-date—including, it is said, compound engines and water-tube boilers—while the North British contend that the traffic does not warrant, and the exigencies of pier accommodation, water depths, &c., do not permit of large and expensive steamers, which would require to be built by the loch side, and which could not be taken out of the loch for heavy repairs, or for sale, should it be found necessary. If trade develops it would be better to increase the number of vessels rather than their size, thereby giving more frequent facilities for passengers. These and other points of variance will most likely stand in the way of vessels being procured for next summer.

The water-tube type of boiler has not, so far, received adoption in steamers engaged exclusively in passenger carrying, except, of course, in the case of private yachts, over which the Board of Trade has not jurisdiction; but a beginning is about to be made in the case of the Caledonian Steam Packet Co.'s paddle steamer *Meg Merrilees*. This vessel is at present propelled by a single engine, working with steam furnished by a "haystack" boiler, but it has been arranged to have new engines of the compound type, and to substitute for the "haystack" boiler two boilers of the "Haythorn" water-tube type, which has been meeting with marked success on land, and has already been supplied for various craft shipped abroad and now in active service. The boilers for the *Meg Merrilees* will work under forced draught in a closed stokehold to a pressure of 200 lbs. per square inch, which will be reduced to 140 lbs. at the engines, whose cylinders will be 21½ in. and 42 in. diameter, by 5 ft. stroke. The substitution of the Haythorn for the haystack boiler, besides ensuring the acknowledged advantages attaching to the water-tube system,

as regards rapid and economical steam raising, will also effect a considerable saving in space and in weight, which in the case of the *Meg* will mean lighter draught and enhanced speed. The compounding of the engines will be done by Messrs. A. and J. Inglis, of Warroch Street, Glasgow, and the boilers will be supplied by the Haythorn Water-Tube Boiler Syndicate, George Square, Glasgow. This company, in conjunction with Captain James Williamson, the enterprising superintendent of the Caledonian fleet, have conducted negotiations and come under obligations with the Board of Trade such as will practically ensure an extension of the three months' period for which a certificate is granted to vessels carrying boilers of any untried or unapproved type, immediately it expires. The success or non-success of this installation of the water-tube boiler on board the *Meg Merrilees* is without doubt a matter which will be waited for with interest, as being of the first consequence to the development of the water tube system in the Mercantile Marine.

Messrs. Steven & Struthers, brassfounders, Glasgow, are preparing at the present time the siren apparatus for five fog-signalling stations around our coasts. As in the case of all the most important recent installations which have been fitted by the Commissioners of Northern Lights, from designs by their engineers, Messrs. D. and C. Stevenson, Edinburgh—including those at Pladda, Rattray Head, Mull of Galloway, Cloch and Cumbrae in the Firth of Clyde—oil engines are employed for driving air-compressers, which charge the accumulators for the sirens. This combination, apparently, now forms the most approved arrangement for this highly important purpose, and restless progress is the lot of those on whom the responsibility of meeting the needs and demands of Clyde shipowners, shippers and merchants devolves. The Clyde Trustees, in response to a deputation of timber merchants, who waited upon them on the subject of increased berthage and storage accommodation at Shieldhall, have instructed James Deas, their engineer, to make out plans for the extension craved. For additional warehousing accommodation at the new Princes Dock tenders have been accepted from Arrol's Bridge and Roof Co., and Messrs. A. and W. Smith & Co., to erect two long ranges of two-story sheds along the centre and north quays of the dock.

The Clyde Trustees have also been approached by the promoters of the unsuccessful Kilpatrick Dock Bill of last session, who read a memorial in favour of the carrying out of the scheme, either by the Trustees or by themselves, under arrangement with the Trustees. It is a matter of disappointment to the Trust to find that the scheme to form docks at Old Kilpatrick is still being persisted in, but the memorial is being considered by the Parliamentary Bills Committee of the Trust, who will duly report. Should the importunate promoters not succeed in bringing the Trust to terms it is thought there may be something of a fight again in the coming Session of Parliament. A motion on the same subject is to be discussed at the next meeting of the Glasgow Chamber of Commerce, to the effect that in the event of the Clyde Trustees declining to provide harbour accommodation, "intermediate between Glasgow and Port-Glasgow, for the service of the counties of Renfrew and Dumbartonshire, the Chamber, which represents the trade and commerce of the West of Scotland, as well as of the City of Glasgow," shall resolve to support, by petition, &c., any well advised scheme that may be submitted to Parliament for that object.

On the Forth, at Leith and Grangemouth, the shipyards continue to receive a share of the new work on the market. Messrs. Ramage & Ferguson have contracted to build and engine a steam pleasure yacht of 500 tons gross. The Grangemouth Dockyard Co. are to build the hull for a steel screw coasting steamer, to be engined by Messrs. Hutson & Son, Kelvinhaugh, Glasgow. The Dockyard Co. have now six vessels under construction, besides extensive repairs to the screw steamer *Abertay*.

The enhanced dock accommodation and facilities with which several ports on the Fifeshire coast are already, and are being, provided—notably Methil and Burntisland, on the estuary of the Forth—constitute, apparently, a matter for envy and emulation on the part of ports on the southern shores of the estuary and higher up the river. Leith, as is well known, is busy augmenting its wet dock area very considerably, and deepening the entrance channel; Grangemouth, higher up, is not complacent by any means as to its dock accommodation and port facilities; and now a movement seems about to be inaugurated for the formation of new deep-water docks at Bo'ness. At a recent meeting of the Town Council, at which representatives were elected to serve upon the Harbour Board, it was stated that some developments in connection with harbour matters might be looked for next year. The Harbour Board would require to move for the early construction of a large deep-water dock, not only because of the limited accommodation of the present dock for the shipping trade, but because the pit wood trade was rapidly drifting into vessels of large tonnage. If Bo'ness was to keep abreast of the times and not be eclipsed by some other port, the dock accommodation would require to be made suitable to the trade. If coalmasters and exporters in Stirlingshire and Lanarkshire were to be put on an equal footing, as regards export facilities, with the Fife coalmasters, a new deep-water dock at Bo'ness was urgently needed. Two competing railway companies entered the port, and with a little pressure by the Harbour Commissioners and with the influence and support of the coalmasters, the new dock could be got.

Dundee shipbuilders continue to enjoy a run of prosperity in the way of fresh contracts. In addition to two steamers, each of about 1,000 tons, ordered about the end of October from the Caledon Co. by Messrs. Thomas Wilson, Sons & Co., Limited, of Hull, the same builders have received an order from the same owners for a third vessel of somewhat larger dimensions than the others. All the vessels are for this well-known company's continental passenger and cargo traffic, and are to be built to the rules and under the special survey of the British Corporation Registry.

The floating dock which the Dundee Shipbuilders' Co. have constructed for the Roumanian Government has now been all shipped in sections and is on the way to Galatz, on the Danube, where it will be re-erected and launched into its station on the river, alongside the Government Arsenal. The first use which will probably be made of this dock, which is 170 ft. in length, is the construction of several, if not all of six gunboats which the Roumanian Minister of War has just ordered to be built for the Roumanian navy.

At Aberdeen the Harbour Commissioners have adopted a scheme for the lighting of the quays and harbour sheds by electricity. Electric beacons will also be provided at the dock entrances for the better navigation of vessels at night. The supply of current will be taken from the Corporation mains, and the annual cost is estimated at £1,700.

Messrs. Hall, Russell & Co., Aberdeen, whose business as engineers and shipbuilders has just been taken over by a "Limited" company, retaining the same designation, have been intrusted by Messrs. George Thompson & Co., of the same city, to build and engine a steamer for the cargo and passenger trade of the company to Australia and South African ports, similar in size and description to the steamers above noticed, as having been placed with Messrs. R. Napier & Sons, Govan. In the latter part of October the firm also contracted to build a steamer of about 930 tons, for Messrs. A. Booth & Co., Liverpool, and a steel steam trawler of 146 tons gross.

Messrs. A. Hall & Co., Aberdeen, about the end of October contracted to build a steam trawler, of 200 tons gross, for Mr. C. Pickering, of Hull.

The project for a Glasgow International Exhibition in 1901—the opening year of the twentieth century—has now been set agoing in a constitutional fashion, and the guarantee fund now approaches £300,000. The Town Council of Edinburgh have become gurantors to the extent of £2,500, as in the case of the previous Glasgow Exhibition, but the undertaking was not agreed upon until after some carping reference to Glasgow Corporation not having been on the list of guarantors for the last Edinburgh Exhibition. Notices of motion, also, have been given by two members of the Edinburgh Merchants' Association to the effect that "a committee be appointed to confer with some of the leading Edinburgh citizens with a view to promoting an International Exhibition, to be held in Edinburgh in 1899." Two years ahead of the Glasgow show! What magnificent enterprise on the part of dear old Edinburgh! If the project does go on, doubtless there will be wind enough left to fill the sails of the good ship Glasgow.

The Institution of Engineers and Shipbuilders in Scotland began its forty-first session by an opening meeting on 26th October, held in the Institution Rooms, Bath Street, Glasgow, at which there was a "record" attendance, the "standing room only" ideal of a "good house," being more than realised. Mr. George Russell, of Motherwell, the new President, in his presidential address reviewed the history of the Institution since its commencement in 1857, dwelling particularly on the indebted-

ness of the Institution, both at its foundation and throughout the early years of its history, to the unflagging services of the late eminent Professor of Engineering, W. J. Macquoin Rankine. There had been many eminent engineers associated with the city and University of Glasgow, said its President, but probably no one since James Watt has had such an extended reputation or exerted more influence on other engineers than Rankine. It was therefore much to be regretted that as yet no statue or public memorial had been erected in Glasgow to commemorate his work, although a quarter of a century had elapsed since his death.

The Institution's "Marine Engineering" gold medal was presented to Mr. Robert Caird, Greenock, for his paper on "Propeller Diagrams," and premiums of books were also presented to Mr. John Inglis, of Pointhouse, for his paper on "Rates of Speed and Rates of Freight"; to Mr. Robert Simpson, for his paper on "Tunnelling in Soft Material"; to Mr. J. G. Stewart, for his paper on "The Manufacture of Welded Iron and Steel Pipes." Afterwards, Mr. Hermann Kühne, London, read a paper on "The Proell-Corliss Engine and the Proell Valve Diagram," on which there was some discussion, and Mr. F. J. Rowan read one on "Water Tube Boilers," discussion on which was deferred till next meeting.

Besides the resumption of the discussion on Mr. Kühne's paper, and on that of Mr. Rowan, the meeting of the Institution on the 23rd ult., was occupied with the reading of a paper by Mr. Robert Caird, of Greenock, on what he designated, "A Graphic Log," which, with accompanying diagrams and discussion, may be given in a future number. Meantime a sentence or two will indicate the purpose and scope of Mr. Caird's contribution. He began by referring to certain statements made by Mr. Nisbet Sinclair in the course of a paper read by him last session on "The Estimation of the Power of Steamships at Sea, and of Feed and Circulating Water at Sea." Referring specially to the remark: "I am aware that shipowners or their superintendents have various ways of analysing the performances of their ships, and it would be interesting to know what plan is found generally most convenient and useful." Mr. Caird said he proposed to present a plan which he hoped might be found a useful and convenient one. The subject was really one of considerable importance, and he did not know that members of that Institution could be more profitably employed than in analysing the efficiencies of ships and machinery. The data necessary for such analysis were to be had for sea-going conditions—and these were, of course, the ruling conditions—from owners only. Mr. Sinclair's appeal for carefully compiled records on shipboard, therefore, deserved the heartiest support. The analysis Mr. Caird had to present was that of one voyage of a mail steamer, made for the purpose of discovering the cause of a loss of efficiency. The remedy in this case, as it happened, had been easily applied, and they were not in any way concerned with it in the paper he was submitting, which merely suggested and exhibited a form of graphic log, and explained what deductions could be drawn from such simple data as might easily and without labour be recorded in ordinary ships' and engineers' logs.

TRADE NOTES FROM THE TYNE, WEAR, TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE TYNE.

Shipbuilding.—At this moment the condition of trade points to a coming busy time in shipbuilding; and near as is the end of the year, we shall expect to see a greatly improved demand for labour at the various centres of the industry before the cycle is completed.

The most important factor in a prospective larger enquiry for steam tonnage is a healthier tone in the freight market, and that this is now manifesting itself, is recognised by all. The foresight of our commercial communities is constantly on the alert to discover and cultivate new markets and new routes of traffic, and that their striving is not resultless, has been time after time most abundantly demonstrated. The effect on business of successful efforts in the direction indicated, must necessarily be towards expansion, and we believe that the exercise of the speculative spirit in certain cases, which we need not specify, will materially assist in stimulating the demand for new ships in the immediate future. The requirements of Japan in the matter of cargo-carrying accommodation, as well as in warships, will also help to swell the "flowing tide," and there are other influences which need not be detailed that will have a contributory effect in bringing about the coming "boom." True, the existence of a partial deadlock in the engineering trade must be regarded as a serious obstacle—while it lasts—to development in shipbuilding. By the time these Notes are in print, however, we expect the obstacle will be removed, or at all events, will be undergoing the process of removal. By that time the joint conference which is now being arranged for will have been held, and will possibly have ended its work. We are strongly disposed to think that the ending of the conference and the ending of the strike, will be simultaneous events. We also have the conviction that the ending of the dispute will be the virtual surrender of the engineers, and the establishment of a new order of things—as between employer and employed—in the engineering industry.

The new order we refer to, however, is not an alteration of the working hours, but the restoration to the masters of the power, which, in the course of years, was gradually filched from them. We know quite well the masters will be content with no other ending than this; for it is only by the rectification of things that have gone wrong that they can be indemnified for the huge losses they have been subjected to during the last five months. Their sacrifices would be gone for nothing if they had again to submit themselves to the galling yoke of the trade union, and they would be dolts indeed were they to adopt the latter alternative, when they are not only masters in the general sense, but also "masters of the situation." The engineers have all along—or at all events from the time when they began to see defeat looming in the distance—been clamouring for a conference, and now they are about getting their wish fulfilled, though not exactly after the manner of their choosing. They have had to accept the conference of the masters' ruling, instead of the kind of conference desired by themselves, and this extraordinary exhibition of docility on their part may be taken as the forerunner of a further "climb down" when the time comes. But the men and their leaders know quite well that they are beaten, and if generous feeling was a quality much in vogue amongst them, they would find some way of showing their gratitude to the masters for consenting to a conference, when such can serve no other purpose than that of a salve to their wounded feelings.

Settlement by conference is less humilating than settlement by a general scramble for jobs, and as the latter would surely come in a couple of more weeks, the employers must be credited with wonderful forbearance in foregoing the advantage. Would the engineers, if the conditions were reversed, be equally magnanimous? By consenting to a conference the employers have effectually disposed of one calumny that has been hurled at them time after time, namely, that they wanted to "smash" the engineers' union. If "smashing" was their intent, they would neither recognise the union nor treat with it. They are now doing both, however, and if the trade union officials who so pertinaciously repeated the calumnious statement, have the least regard for their own reputations they will make haste to apologise.

The Executive Council of the Boilermakers' Society have got the best of it in their skirmish with the London members, and their firmness in dealing with the latter has been greatly commended in this district. The members on the North-East Coast will doubtless learn from this that they cannot with impunity set their properly elected leaders at defiance. The incident will, of course, strengthen the confidence of the employers in the executive's power to make the members fulfil agreements entered into, and the strengthening of confidence is always beneficial to the interests of trade. So far as regards the interests of the trade union, however, it is not a healthy sign that disaffection should be manifesting itself in one of the most important districts, while preference for other people's advice before that tendered by the executive was on a recent occasion shown very frankly by 24,000 out of the 40,000 members.

It would seem that the heads of the society are not regarded with any special veneration by the great body of the members, and though, through their unyielding attitude on the London question they may be admired from the outside, there certainly is not much evidence to show that they are admired from within.

It is understood that Messrs. Armstrong, Whitworth & Co. have at last succeeded in obtaining possession of the chain testing works, which are situated in immediate contiguity to their Low Walker shipyard, and which, it is stated, have long been desired by the company's managers as a most useful adjunct. This addition to the yard will enable the firm to re-arrange their building berths in such a way as to afford ample space for the building of vessels up to 700 ft. in length. It is rumoured that the company have now an order for a vessel 650 ft. long, and this, it is said, will be put down in one of the altered berths.

The announcement was recently made that Messrs. Hawthorn, Leslie & Co. had been commissioned to build for the Russian Government a couple of large torpedo destroyers, to be propelled on the principle adopted in the *Turbinia*. The statement has since been officially contradicted, so that, of course, it may be reckoned to count for nothing. Speaking of the *Turbinia*, however, we may state that a trial of the principle of propulsion adopted in that vessel is likely to be made by a Government nearer home than that of Russia, and there is reason to believe that a vessel will be specially built to afford facilities for the trial. At present Messrs. Hawthorn, Leslie & Co. are making extensive alterations in the arrangement of their shops, with a view to provide space for lengthening the building berths and increasing the productive capacity of the works generally.

The Palmer Co. are exceedingly busy on new work, and are carrying out a very extensive repair contract on the s.s. *Rotterdam*. The company have just laid the keel at their Jarrow yard for a large steamer ordered by Liverpool owners.

The Tyne Iron Shipbuilding Co. are reported to have an order from the owners of the Stag Line, for a steamer of medium size, which will be built to take Lloyd's highest class.

Messrs. Readhead have, as usual, all their berths filled; and at Messrs. Stephenson's and Messrs. Dobson's yards appearances are indicative of brisk work, as soon as existing obstacles are removed from the way of trade. In reference to Messrs. C. S. Swan & Hunter's establishment, and also Messrs. Wigham Richardson & Co.'s, there is nothing new to note this month; but at Messrs. Wood & Skinner's the outlook has improved, the firm having received orders for vessels to succeed those now on the stocks.

Repairing establishments on the lower reaches of the river are well employed, and the Wallsend pontoons are kept pretty constantly occupied.

Engineering.—As showing that the engineering trade of the district has not been reduced to a state of utter collapse, it may be mentioned that the North-Eastern Marine Engineering Co., of Wallsend, have sent no less than seven steamers on their trial trips during the period of the strike—three of them within the space of a week—and that all the trials were attended with the most absolute success. Though the actual fitting of the engines on board was done by apprentices and non-union men, results have demonstrated that the work was none the less effectively completed on that account, and that the members of the union are very far indeed from having a monopoly of skill. The most important of the trials was that of the s.s. *Russie*, built for French owners by the Sunderland Shipbuilding Co., Limited, and in this case the guaranteed speed of 16 knots was very easily exceeded. At the other marine engine works the execution of work in hand is making excellent progress, considering the difficulties in the way, and in the locomotive establishments the progress being made is still more satisfactory.

The various departments of Messrs. Clarke, Chapman & Co.'s Works, are well supplied with orders, and notwithstanding the inconvenience resulting from the strike, a very large weekly output of ships' deck accessories is maintained. In the iron foundries business is slack, and a good proportion of the moulders are idle. Forges and chain and anchor works are moderately well employed, and in the iron rolling mills a comparatively brisk business is being done. Electrical works are, generally speaking, well supplied with orders.

Blyth.—The Blyth Dry Dock Co.'s new graving dock was formally opened on the 10th inst., the new steamer *Port Victoria*, of the Milburn Line, being the first vessel to pass over the sill. The dock is 480 ft. long, and is capable of accommodating vessels of the very largest tonnage. The pumping machinery, supplied by Messrs. Gwynne & Co., London, is of the very latest type, and is capable of delivering 56,000 gallons of water per minute against a head of 30 ft. All the other accessories are of the very best description, and considering the extensive facilities for carrying out repair contracts already possessed by the company, there is every reason to expect that the making of this exceptionally large and well equipped graving dock will result in bringing to Blyth a much larger quantity of the most important class of repairing work than has hitherto found its way there. The Blyth Shipbuilding Co. have a large vessel on the stocks, and the frame material for others to follow has been delivered. Owing to the engineering trade dispute, however, the work is not being pushed on very actively, and a large number of platers, rivetters, and other classes of operatives, are temporarily condemned to enforced idleness.

THE WEAR.

Shipbuilding.—Since last month several orders of importance have been booked by builders on the Wear, among them being one for a similar steamer to the French mail boat *Russie*, received by the Sunderland Shipbuilding Co., from the owners of the latter, and another for an Australian liner of large size received by the same firm of builders, from Mr. W. Lund, of London, for whom they have built a number of vessels of superior type. Another order reported is one from Messrs. Pickard, of London, booked by Messrs. Doxford, and we are now in a position to state that Messrs. Osborn, Graham & Co. have received an order for a vessel from the Broomhill Coal Co., and that they have another order for a cargo vessel of some 5,000 tons capacity. This will be good news for the immediate locality, as the yard has been practically inoperative for some time past.

Messrs. Blumer & Co. have received an order for a vessel of good size from Newcastle owners, and having sold two new steamers that were launched by them earlier in the year, work prospects in the yard are showing a marked improvement. The Strand Shipbuilding Co. are reported to have booked an order from local owners, and it is known that Messrs. Austin have an abundance of work in both the new and repair lines.

The whole of the yards at Southwick—three in number—are now in operation, one of them being about as busy as at any former period, and the establishment of Sir James Laing & Co., Deptford, is still—notwithstanding the engineering impediment—showing a fair state of briskness. Among the orders in hand are two steamers of good size for Messrs. Bullard & King; two of larger size for Japanese owners; and one still larger for the Anglo-American Oil Co. The latter vessel has now been some fifteen months in hand, but there is no hurry with the work of construction, as an unusually long time is allowed for delivery.

Messrs. Short Bros. have their berths fully occupied, and are keeping the frame furnaces going night and day. To further extend productive capacity, the firm are now putting down an additional gas engine by Messrs. Crossley, Manchester, which, it is understood will be the largest in the district. New pumping machinery to be driven by electric motors has been put down at the Bridge Dock, and other improvements have been made, which it is expected will have the effect of greatly enhancing the special facilities possessed by the proprietors of the dock for carrying out repair contracts to both the hull and engines of vessels with economy and dispatch.

Messrs. J. L. Thompson & Sons, are, it is understood, well supplied with orders, and have the whole of their berths filled with vessels in progress. The firm have just completed a fine cargo boat, the *Port Victoria*, for Messrs. Milburn & Co., and have also recently delivered to the owners—the Mercantile Steamship Co., the s.s. *Min*, of nearly 5,000 tons capacity. At the time of writing the firm are getting ready for launching a steamer 430 ft. long, ordered by German owners, and it is expected that another vessel which is now nearly plated, will be put off the stocks before the end of the year. Should this expectation be realised, the output of the firm for the current year will be a very large one, reaching probably to 40,000 tons. This will easily place them first so far as the Wear is concerned, and we don't think they are likely to be greatly out-distanced by any firm on the north-east coast, unless it is Sir Wm. Gray & Co., who have three yards in operation.

There are just now idle at this port, a considerable number of platers, rivetters, and caulkers, members of the Boilermakers' and Iron Shipbuilders' Society. There are also a good many joiners and shipwrights unemployed; but work would soon be found for them all, if only the impediment of the engineering dispute were out of the way.

Engineering.—The Sunderland Engineering and Electrical Exhibition of 1897 was opened, on the 22nd inst., by Lord Londonderry, a very numerous company of local notabilities

connected with shipbuilding, engineering, and other industries being present. The building in which the exhibition is held is a very extensive one, having been specially erected for the occasion, and the ventilating and lighting arrangements are thoroughly up to date. Among the principal local firms exhibiting are Messrs. Doxford (who occupy a very large amount of space, and are exhibiting their patent roller press for joggling plates), and the Sunderland Forge Co., while, of Newcastle firms there are Messrs. Clark, Chapman & Co., Messrs. Thos. Proctor & Son, and others. There are besides a variety of interesting exhibits from all parts of the country, and there is little reason to doubt that the show will be liberally patronized by the public.

At the Southwick Engine Works business is fairly active, the firm having succeeded in getting almost a full number of hands in their various departments. Among the vessels engined by the firm since the strike commenced may be mentioned the splendid cargo steamer *Orissa*, built for the British India Steam Navigation Co., by Sir James Laing, and said to be among the very largest cargo boats ever built on the Wear. At the Palmer's Hill Works some exceptionally heavy castings have recently been delivered, and an addition has been made to the number of pattern makers employed.

Messrs. John Lynn & Co., of the St. Luke's Engine Works, Pallion, are very busy with the manufacture of steam winches, and other deck accessories, and their foundry department is also kept briskly going, mainly on account of their own requirements. The local forges are on the whole kept fairly busy, but in the larger foundries slackness is general.

The Hartlepools.—Messrs. Sir Wm. Gray & Co. are reported to have booked some new orders during the month, and other local shipbuilding firms are well off for work. Steel works are kept going steadily, and work in the engine shops is being pushed on as rapidly as circumstances will permit. The announcement has been made that dock extensions to cost about £50,000 have been decided on, and are about to be carried out.

Stockton.—All the shipbuilding firms at this centre are said to have booked orders lately, and when the engineering trouble is ended an exceptionally busy time is sure to ensue. Messrs. Blair & Co. have been singularly successful in getting vessels fitted with their engines during the period of the strike, no less than half-a-dozen vessels having been sent on their trial trips from the works. The smaller engine works are kept moderately busy.

Middlesbro'.—The outlook for shipbuilding here is further improved by one or two additions to the contracts held by local firms. Bridge-building and boiler-building works are very busy, and in the former some new work of importance has been secured. In the docks timber imports are numerous, and the demand for labour is consequently pretty brisk. At the steel works signs of activity are increasing.

Darlington.—The Forge Works continue to be well employed, and local foundries are busy.

Consett.—At the Consett Iron Works orders are plentiful, and the weekly output of plates, bars, &c., is above the average.

THE MERSEY.

(From our own Correspondent.)

THE engineering trades lock-out and strike has, during the past month, again largely interfered with operations both in the shipbuilding and marine and general engineering industries of this district. The movement has gone on steadily extending, and there have been further important additions to the Employers' Federation in this district, including five firms in the neighbourhood of Manchester, six in Wigan, and seven in Rochdale; the total number of firms who had posted notices in the Lancashire district, when the conference agreement was come to, being about a hundred and sixty. This steady extension of the lock-out is in itself sufficient evidence of the serious position that has been brought about by the policy pursued during the last few years by the trade union organisations. In support of the determined stand the federated employers have taken up against the trade unions, a series of typical cases of trade union interference in workshop regulations, restriction of output, interference with the working of the machines, restriction of overtime, and interference with apprentices, have been published by the Federation. It would be impossible to give details from these varied lists, but it may be stated that they cover all parts of the country and apply to every branch of the engineering trade. These examples of restriction and interference by the trade unions represent the cases which the employers have laid before the conference, which has been arranged for settling the dispute, and with regard to which they are determined they will not be subject to a repetition of them in the future, but that they shall have perfect liberty in the management and control of their workshops, and in the class of labour they shall employ upon modern machine tools.

With regard to the position at works in the district during the month, there is no material change to report. A good deal of work has had to be held in abeyance, pending the settlement of the dispute, and there will probably be exceptional activity in completing orders when the works are restarted, although this may be followed by a slackening off. It may, however, be mentioned that some of the establishments have decided to employ no society men in future, whilst at others the notice as to the retention of men engaged during the strike will probably be carried out, so that a certain proportion of the union men will find re-employment difficult to obtain when the strike is at an end.

Messrs. Laird Bros., of Birkenhead, inform us that the destroyers *Seal* and *Wolf* have completed their preliminary trials very satisfactorily, and are about to take their series of official trials. This will complete the lot of 30-knot destroyers constructed by Messrs. Laird for H.M. Navy, with the exception of the *Orwell*, which has just been ordered. There is no doubt their performance will equal that of the earlier boats, some of which attained a higher mean speed on official trial than any other vessels of this class. It is interesting to know that they are seaworthy and sea keeping, as well as extremely fast, the *Quail* being now on the North-American station, the *Sparrowhawk* and *Virago* with the Pacific Squadron, and there are also two 27-knotters, *Banshee* and *Dragon*, in the Mediterranean. This firm have also launched, on the 27th November, a fine steam yacht, for His Serene Highness the Prince of Morocco, of which we may be able to give a few particulars next month.

Works have recently been established in Manchester by the Manchester Acetylene Gas and Carbide Co., for the manufacture of Kay's patent safe acetylene gas generators, and special fittings for acetylene gas lighting. The company have already executed important orders for lighting appliances of the above description for the Manchester Ship Canal Docks, where they are at present being used not only for lighting the quay side, but for the loading and unloading of vessels, and so far they have given very great satisfaction. In our next issue we hope to go more fully into descriptive details of these improved lighting appliances, and also to give illustrations of the latest form of acetylene gas generators, which have been introduced under Mr. Kay's patents, as these will be of special interest to shipowners and to many of our general readers.

Mr. T. Bradley, engineer and tool maker, of Accrington, who has recently removed from his old establishment in Moreton Street, to more commodious premises in Dale Street, has introduced a new design of drilling machine, in which several improvements have been introduced. The wheels are of cast crucible steel, thus being practically unbreakable, and have been arranged so that they are specially suitable for users of twist drills, &c. The spindle of the machine will pass through the feed-screw, thus providing an additional long bearing. When the machine is ordered with fast and loose pulleys an arrangement is made whereby the strap is moved from fast to loose pulley by a strap fork, which passes by a bar through the frame, so that there is no danger of the user being hurt by the strap. The machine, which weighs only three hundredweight, has two fly-wheels, which give very steady working, and will drill holes up to 1½ in.

The iron trade has maintained a firm tone during the past month, the improved outlook with regard to a resumption of operations at engineering and iron works necessarily tending to strengthen the market, and a moderate business has been put through, with prices in some brands of pig-iron showing a hardening tendency. Local brands are firm at late quotations of 45s. and 45s. 6d. for forge, to 48s. 6d. for foundry, less 2½ delivered here. Lincolnshire iron is without quotable change, but very strong at full rates, averaging 43s. for forge, to 45s. 6d. for foundry, net, delivered here. For Derbyshire foundry, prices are about 1s. higher than at the commencement of the month, 47s. 6d. to 48s. 6d. net cash being now about the average quotations, delivered Manchester. Middlesbrough is not quite

so strong owing to the giving way in warrants, and makers are prepared to book at 50s. 6d. net, delivered by rail Manchester, with sellers at 3d. to 6d. less in the open market. Scotch iron has shown a decided upward move, so far as makers' quotations are concerned, Glengarnock being nominally quoted 47s. 9d.; Eglinton, 48s. 6d. to 48s. 9d. at ports, with 2s. to 2s. 3d. more at Manchester Docks, but these prices are quite out of the market, both Eglinton and Glengarnock being obtainable through second hands at 6d. to 9d. under the above quotations. Supplies of American pig-iron at Manchester Docks are rather short, but there are considerable quantities afloat, and prices are without material change, ordinary brands being still quoted 46s. to 46s. 6d. at docks.

During the greater part of the month the finished iron trade has been slack, with an easy tone in prices, but towards the close the makers are reporting an increased demand, and are holding more firmly to their prices. £5 12s. 6d. is now the minimum for Lancashire bars, with some makers getting £5 15s., and one large firm nominally quoting £5 17s. 6d. Sheets remain at £6 15s. to £6 17s. 5d., and hoops £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, and 2s. 6d. less for shipment.

The position in the steel trade has undergone steady improvement. Ordinary foundry hematites are not quoted under 56s. 6d., less 2½, with 1s. 6d. more asked for some special qualities. Billets are firm at £4 6s. 3d. net cash; bars, £6 to £6 5s.; common steel plates have advanced 10s. per ton, and are quoted £5 17s. 6d. to £6, whilst boiler plates average £6 5s. delivered in this district.

In the metal market business is slow, but list rates unaltered. Delivered Manchester district these remain as under:—Solid drawn brass boiler tubes, 7¼d.; condenser tubes, 8¾d.; copper tubes, 8¾d.; brazed copper, gas, and steam tubes, 8½d.; brazed brass tubes, 7¾d.; rolled brass, 5¾d.; brass wire, 6d. to 6¼d.; copper wire, 7d. per lb.

The timber trade has been moderately brisk, but prices are unsatisfactory and difficult to maintain; and stocks are ample. Teak has been too heavily imported, and stocks are large, so that notwithstanding a fair demand prices are easier. Only one cargo of greenheart has arrived; consumption has been moderate, but stocks are ample.

In the coal trade business has fallen off considerably. House coals especially have been in but moderate demand for the time of year, owing to the exceptional mildness of the weather, and although pits are kept on practically full time, the present output is barely being moved away; whilst as regards prices, although there was a general hardening up at the beginning of the month, the full list rates then quoted are scarcely being maintained. At the pit mouth 10s. 6d. represents about the average figure obtainable for best Wigan Arley; 8s. 6d. to 9s. 6d. for Pemberton four-foot and seconds Arley; and 7s. to 7s. 6d. for common house coal. The lower class round coals are plentiful on the market, owing to the limited demand for common housefire purposes, and the continued stoppage of engineering and iron works, and prices are not more than steady at about 6s. to 6s. 6d. for good ordinary steam and forge coal at the pit-mouth. Engine fuel is in ample supply, with low sellers for prompt clearances, and colliery proprietors not so firm on forward contracts. At the pit-mouth, however, best slack is still quoted 4s. 6s. to 4s. 9d.; medium, 3s. 9d. to 4s. 3d.; and common sorts, 3s. to 3s. 6d. per ton.

A quieter tone has come over the shipping trade, and prices are easier, good steam coal not fetching more than 7s. 6d. to 8s. delivered Mersey ports.

BELFAST TRADE NOTES.

(From our own Correspondent.)

NO change of any moment can be reported from this district regarding the all-absorbing topic of the engineers' lock-out. Matters remain in almost the same condition as last month, only Messrs. Workman, Clark & Co., Limited, have been compelled to put their shipbuilding yard on short time in consequence of the work in this department getting so far ahead of their engine works. The result will be that nearly all the vessels on the stocks will be ready for launching before the machinery is constructed. This firm has three large steamers launched awaiting machinery which must cause serious expense and delay both to builders and owners. No launches have taken place from this yard during the month, and as their work at present stands, it is quite evident that unless this deadlock in regard to the engineers comes to an end, this yard will still have further to reduce their staff or close entirely.

Messrs. Harland & Wolff, Limited, are still working in full swing, the rumoured conversion to the ranks of the Federated Employers, mentioned in last month's report, seems still in abeyance.

The construction of the great *Oceanic* is proceeding at a good pace, a considerable number of her frames sternwards are up, and one can form some slight idea of her gigantic proportions. The huge travelling crane or gantry erected over the vessel is working in full swing and must afford very great assistance in the erection of such large pieces of material as are required in her construction.

The s.s. *Briton*, which has been launched for some months is now nearly completed, and is expected to leave this port about the 22nd, to take up her station in the Union Co.'s service to the Cape. We expect to describe this magnificent vessel in a future number.

There will be a few launches very shortly from Messrs. Harland & Wolff's yard, several large vessels getting well forward on the stocks.

Regarding dock accommodation for these large vessels being built at the port, many lengthened discussions have lately taken place at the Harbour Board meetings, as they are at present promoting a Bill for dock-extension, which is most urgently required, both for cross channel service and also for the imports from abroad, as a few facts mentioned by Alderman W. J. Purie, J.P. (Lord Mayor), at the meeting of the above Board on November 17th, will show. He said, that practically speaking the shipbuilders ought to have the best accommodation, because they supplied as near as possible one-seventh of the harbour revenue, as the following table will show:—

HARBOUR COMMISSIONERS' ACCOUNTS, 1894.

	Total Receipts. £ s. d.	Shipbuilders Contributions. £ s. d.
Rates on Goods..	47,415 8 7	3,067 18 6
Tonnage and Quayage	50,871 15 7	3,183 9 2
Lying-up and graving dock ..	4,124 4 11	4,332 18 11
Craneage	9,282 14 0	1,346 0 0
Harbour Tramways	1,489 6 3	70 13 7
Rents..	8,689 10 7	3,897 0 3
	£121,872 19 11	£15,898 0 5

He also gave statistics of the tonnage built by his own firm, Harland & Wolff, Limited, which were that they launched the following tonnage during the five years ending 1877—39,496 tons; 1882, 21,318 tons; 1887, 139,090; 1892, 259,981 tons; the tonnage output for the last five years ending 1897 equals 354,757 tons, making the total for the last twenty-five years of 864,642 tons, it should therefore be the policy of the Harbour Board to keep in advance of shipbuilders and shipowners in the facilities provided, especially in graving dock accommodation.

In another paragraph in his speech he mentioned that a company had asked for dock accommodation to berth large steamers, and said he had had interviews within the last few months in America with one of the biggest firms, who wished to know how they could bring coals into this country. They were prepared to employ ships of 14,000 tons, and to supply five million tons a year to Belfast, Glasgow, and Liverpool, at 8s. 3d. per ton, better coals than we can get at home.

Another argument in favour of dock extension was that for every 10,000 tons of shipping built at the port 1,000 additional men would be required, which meant increased population to the city; it was also stated that plenty of warships could be got, both from Home and Foreign Governments, providing they had graving dock accommodation suitable.

In accordance with the above the Harbour Trust have resolved to promote a Bill for a large dock extension, including a large graving dock, which will no doubt meet the wants of this rising port for some time to come.

The various smaller engine works in town are pretty busy, but are considerably hampered for the want of hands. Let us hope that by the time a next issue is printed that the engineers' labour difficulty may be amicably solved, and when the advent of another year arrives may peace and plenty of work be the watchword.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow-in-Furness.—The past month has in no sense imparted new life to the shipbuilding interest of this district. Indeed, nothing new can be expected until the engineers' dispute is settled, as it is putting a check not only to the orders in hand, but to the new trade which otherwise would be coming this way. It is probable this check, however, will prove advantageous in one way, inasmuch as orders long delayed will come to hand more freely and in greater numbers, and there will be the more certainty that they will be proceeded with without any stoppages caused by industrial disputes. It is quite expected that when terms are settled between the Federation of Engineers and their workmen, all the numerous difficulties which have arisen, over and above the two great difficulties of hours of labour and the working of machines, will be settled and definitely arranged before the men return to work. If this is so, we may confidently look forward to a long period of industrial activity, and this will have its effect on the shipbuilding trade perhaps to as great an extent as on any other. During the month no new orders have been given out to Barrow builders, and, indeed, the demand for new tonnage in the open market is anything but active, and there are scores of yards in need of work much more so than is the case at Barrow. During the past quarter—in fact since the engineering difficulty commenced—no less than 33,000 tons of shipping tonnage has been fixed at Barrow, which, with the 24,000 tons in hand prior to the strike, brings up a respectable total. Yet there is scope for a very big programme of work at the Barrow yard. As set forth by Messrs. Vickers, Son & Maxim, in a prospectus issuing £1,250,000 of 4 per cent. debentures, at the Naval Construction Works fourteen big ships can be building at one time, and the construction of their engines proceeded with as well. But this does not show the capacity of the place, for fourteen keels of large ships can be down at one time, while half that number of vessels are frequently to be found in the Devonshire Dock at Barrow receiving their engines and boilers and getting their complete sea equipment. If, as is the intention of the new owners of the Barrow yard, a very big programme of industrial operations is to be adopted, Barrow will soon come to the front in the point of annual tonnage constructed. Hitherto the yard has only been crowded with work by fits and starts, and the unsteadiness of operations has led to a marked fluctuation of population from time to time. This, it is expected, will be altered in the future, and more regularity and stability given to the trade. Some important foreign orders are expected, but nothing much will be done in this direction until the engineers are again at work, and then it is quite on the cards that not only will other orders be sought from the Admiralty, but that foreign orders for warships of all classes will be obtained, and the work in the yard supplemented by the building of modern types of warships, such as any Power would readily buy before or after completion. It is the intention of Messrs. Vickers to adopt this latter programme, so that they may produce from their own resources warships built and engined by themselves, utilising their own make of armour and their own manufacture of guns. Recent experiments have proved how well Messrs. Vickers are to the front alike with their armour plates and their guns. We may expect that they will shortly display their further complement of resources by the building of ships in which their armour plates and guns will be employed. It is easy to see what a great field of industrial and commercial activity this will open up for Barrow, especially as at the same time it is the intention of the firm to devote much attention also to commercial tonnage. A fair amount of progress has been made during the month in the work in hand, but some departments are yet at a standstill owing to the engineers' quarrel, and if the latter is continued after Christmas further batches of men will have to be paid off. The first-class cruiser *Amphitrite* will be ready for launching in the early part of next year, and about the same time the first-class cruiser *Niobe* will be ready to take her trials and to proceed to Chatham, where a dock is being built for the accommodation of this class of vessel. The new Fleetwood steamer, the *Duke of Cornwall*, will not be launched till next year, although she is ready now. The trials of the torpedo-boat destroyers will be again entered upon in a week or two, when it is expected the four built at Barrow will go through their evolutions and perform their speed as 30-knotters satisfactorily. The repair work in hand at Barrow includes the tripling of two Clan liners, and other repair work is expected.

West Cumberland.—The shipbuilding trade in West Cumberland is steady, and although the business doing is in small tonnage craft, the yards are kept well employed. One vessel has been launched at Workington during the month, and Messrs. R. Williamson & Sons, of that place, have received an order to build a screw steamer of about 600 tons for Messrs. Roger & Bright, of Liverpool.

Shipbuilding Material.—There is not much variation to note in the steel shipbuilding material trade. The demand has been very quiet for some time, but the mills have been kept regularly employed, and makers have still plenty of orders in hand. The decision arrived at some time ago that the plate mills at Barrow would be closed down, owing to the inability of makers securing a profit on the orders they got, has not been carried into effect, and the probability is that the mills will not be closed down until a much lower range of values rule the market than at present, and of this there is no immediate probability. Indeed, it is evident there is about to be experienced a marked improvement in the demand, not only from local, but from general sources. Much business in this department of trade has been held back for some time, because builders have not been able to accept deliveries owing to the delays which have been incidental to the progress of work through the stoppage of the engineers. Once that dispute is settled, the demand for steel shipbuilding material will increase, and it is probable from local sources the demand will be much larger than it has ever been, and from general sources there are indications that the demand will be very full. This is expected to be especially the case as regards heavy and light plates. The business doing in sections is likely to be on a fuller scale, and the orders that are being given out for heavy steel castings and forgings, already very large, will assuredly be larger in the near future. Barrow stands well for the heavy steel casting trade, and this is a business that is likely to expand, but it is, to say the least of it, very remarkable that there is not a single steel forge works on the West Coast. Now that Messrs. Vickers, Son & Maxim have taken over the Naval Construction and Armaments Co., and intend to put more life into the shipbuilding trade of the district, the need for local forge works will be even more demonstrated than at present, and sooner or later it is certain that either Messrs. Vickers will find it necessary to add this department to their works, or to give encouragement to some other firm to put down an extensive forge plant in Barrow, capable of tackling the heavy work required by shipbuilders or engineers. It is noteworthy that the Naval Construction Works is now furnishing Messrs. Vickers' Sheffield establishment with an important accession of new orders for work required in the shipbuilding and engineering departments of trade. These orders, previous to the amalgamation, went to Darlington, Glasgow, and elsewhere. They are now sent to Sheffield, and will doubtless in the future represent a considerable addition to the business already carried on at the River Don Works.

Hematites.—The demand for hematite pig-iron is well maintained, and business has been done during the month at an average price of 48s. per ton net f.o.b. for mixed Bessemer Nos. Makers are very fully sold forward, and the opinion is general that an even better trade may be expected after the Christmas holidays. Stocks have been reduced this year by something over 112,000 tons, and they now total up to 180,000 tons. There is likely to be an increase in the make of iron, and steel makers are preparing to use fuller supplies.

Shipping.—The shipping trade at West Coast ports is briskly maintained. The total exports this year have reached 383,862 tons of pig-iron, and 408,209 tons of steel, as compared with 289,147 tons of pig-iron and 432,693 tons of steel in the corresponding week of last year, showing an increase of 94,715 tons of pig-iron, and a decrease of 24,484 tons of steel.

Paddle Steamer.—The contract recently in the market for another paddle steamer for the Eastham Ferry service on the Mersey, has been secured by Messrs. John Jones & Sons, of Liverpool. This vessel will be somewhat larger than the *Ruby* and *Pearl* just built by the same firm, and will also be built under special survey to receive the classification of the British Corporation Registry.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—ENGLISH.

Marie Stephanie.—On October 11th an iron steam trawler was launched at Shields of 120 gross tonnage, named the *Marie Stephanie*. She is owned by Messrs. Hessens & Willems, her port of registry being Ostend.

Saint Leonards.—On October 11th a steel schooner-rigged steamer of 4,200 gross tonnage, was launched at Wallsend-on-Tyne, for Messrs. Rankin, Gilmour & Co., Liverpool. She was named the *Saint Leonards*.

Captain.—On October 12th an iron ketch-rigged steamer, of 185 gross tonnage, was launched at Beverley. She is owned by the East Coast Steam Trawling Co., Hull, and was named the *Captain*.

Trafalgar.—On October 14th there was launched at Hull an iron steam ketch, of about 163 tons, named the *Trafalgar*, for Messrs. K. W. Parker and others, of Grimsby.

Victory.—On October 14th there was launched at Hull an iron steam ketch, of about 163 tons, named the *Victory*, for Messrs. K. W. Parker and others, of Grimsby.

Nordfarer.—On October 26th there was launched from the Jarrow yard of Palmer's Shipbuilding and Iron Co., Limited, a large screw steamer of the following dimensions, viz.:—Length, between perpendiculars, 365 ft., by 48 ft. 6 in., by 31 ft. 6 in. moulded depth. The vessel is of the spar-deck type, having a full poop, bridge, and topgallant forecastle, and is being built under special survey for the highest class in Lloyd's Registry. She will be rigged as a two-masted fore and aft schooner. The accommodation for the captain and officers is fitted in a steel deck-house, on the fore end of bridge. The engineers' berths are fitted in the bridge at each side of the engine casing, and the seamen and firemen are berthed forward in the topgallant forecastle. Water ballast is provided for in a cellular bottom extending all fore and aft, and in a chamber tank fitted at the aft end of the main hold, and also in the fore and after peaks. The hull is divided by six watertight steel bulkheads, all extending to the upper deck, and she will be fitted with all the most modern arrangements for the loading and discharging of cargo, and the working of the ship. The vessel is designed to load upwards of 6,000 tons deadweight on a mean draught of 22 ft. 6 in. The engines, which are also being constructed by the Palmer Co., are of the triple-expansion type, with cylinders 25 in., 41 in., and 66 in., by 45 in., steam being supplied by two single-ended boilers, working at a pressure of 100 lbs. per square inch. The vessel has been built to the order of the Norden Steamship Co., of Copenhagen. As the vessel left the ways she was christened the *Nordfarer* by Mrs. Nielsen, wife of the Rev. B. Nielsen, of Newcastle. After the launch the company adjourned to the offices of the company for refreshments, where the usual congratulatory toasts were honoured.

Idaho.—On Tuesday afternoon, October 26th, the latest addition to the already very numerous fleet of Messrs. Thomas Wilson, Sons & Co., of Hull, was launched from the East yard of Messrs. C. S. Swan & Hunter, Limited, of Wallsend. This vessel, which is named the *Idaho*, is of an exceptionally fine model, and has been built for Messrs. Wilson's Atlantic cattle and cargo trade, and she is also intended to carry a limited number of first-class passengers. Her dimensions are—470 ft. over all; 460 ft. between perpendiculars, by 50 ft. beam, and 42 ft. 6 in. depth, moulded. She is building to the highest class at Lloyd's to their three-deck grade, and with a complete shelter deck above. Water ballast will be carried, as usual, in the double bottom and in the peak tanks, and the large cargo, which will amount to over 8,000 tons deadweight, will be manipulated by a large number of very powerful steam winches. Accommodation for the passengers, officers, engineers, &c., will be placed in steel houses on the shelter deck amidships, and the vessel will be fitted up in the 'tween decks with Wylies' patent fittings for 600 head of cattle, with all the latest arrangements for their comfort and ample water supply, &c. The machinery has been constructed by the Wallsend Slipway and Engineering Co., Limited, of Wallsend, and will consist of a powerful set of engines of the latest type, having cylinders 31 in., 52 in., and 91 in. diameter, 60 in. stroke, supplied with steam by four boilers, two double-ended and two single-ended, with a total heating surface of 12,500 square feet, working pressure 200 lbs., Howden's forced draught arrangements and fittings being applied for maintaining a full pressure of steam at all periods. It is expected that the *Idaho* will steam at about 14 knots per hour, and when completed will prove a useful and handsome addition to the register of Messrs. Thomas Wilson, Sons & Co.'s steamers. During her construction the steamer has been surveyed by Mr. J. F. Wilkins and Mr. F. Bishop, and the machinery has been supervised on the company's behalf by Mr. John Spear. On leaving the ways the *Idaho* was christened by Miss Alma Arthur, of Exeter, the ceremony passing off in a completely satisfactory manner, after which the company proceeded to the builders' luncheon-room, where the usual toasts were proposed, the owners being represented by their naval architect, Mr. Wilkins.

Cresyl.—On Tuesday, October 26th, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer, which they have built to the order of Messrs. W. Tulley & Co., of Hull. She will take Lloyd's highest class, and is of the following dimensions, viz.:—Length, over all, 312 ft.; breadth, 43 ft.; and depth, 22 ft. 3½ in. The deck erections consist of a full poop, bridge and topgallant forecastle. The saloon and captain's and officers' rooms will be fitted under the poop. The hull is built with web frames, and cellular double-bottom for water ballast. Four steam winches, steam steering gear amidships and screw gear aft, patent direct steam windlass, patent donkey boiler, grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Three cylinder triple-expansion engines of first-class make are being supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited. They will develop over 1,000 H.P. The cylinders are 22 in., 35 in. and 59 in. diameter, with a piston stroke of 39 in., and fine large steel boilers, having a pressure of 170 lbs. per square inch, will give an ample supply of steam. The construction of the ship and machinery have been under the superintendence of Mr. Walter A. Sage, of Hull, on behalf of the owners, and the ceremony of christening the steamer *Cresyl* was gracefully performed by Mrs. Owbridge, wife of the Sheriff of Hull. Amongst those present at the launch were:—W. T. Owbridge, Esq. (Sheriff of Hull), Mrs. and Miss Owbridge, Major and Mrs. C. Judge, John Sanderson, Esq. and Miss Sanderson, Edward Harland, Esq., Mrs. Johnson, Misses Alice and Bice Tulley, E. Sanderson, Esq., and Mrs. Sanderson, W. H. Tulley, Esq., Mrs. Tulley, and Mr. Walter A. Sage.

Pearlmoor.—On October 26th this vessel, which was launched by Messrs. W. Doxford & Sons, Limited, at Pallion, is being built to the order of Messrs. W. Runciman & Co., of Newcastle. She is built of the now well-known turret type, patented by the builders. Her length, between perpendiculars, is 340 ft.; breadth, extreme, 45½ ft.; depth, moulded, 27 ft. 3 in. She will have a gross register of about 3,500 tons, and will carry about 5,700 tons deadweight on 21 ft. 8½ in. draught of water. She is fitted with large donkey boiler made by Riley Bros., of Stockton. The windlass is by Emerson, Walker & Thompson Bros., of Blaydon, while the winches—five in number—are by John Lynn, of Pallion, who is also the maker of the steam steering gear. The engines, which are also being built by Messrs. Doxford, have cylinders 26 in., 42 in. and 68 in., by 42 in. stroke, and are driven by two single-ended boilers, built for a working pressure of 160 lbs., while Howden's system of forced draught is also fitted. During the building the vessel has been superintended by Captain Runciman, of South Shields. There was a good company present, the christening ceremony was gracefully performed by Mrs. Jeffery Stephens, of Newcastle.

Dunrobin.—On Wednesday afternoon, October 27th, Messrs. Craig, Taylor & Co. launched from their Thornaby shipbuilding yard, Thornaby-on-Tees, a very handsome steel screw steamer, of the following dimensions:—332 ft. by 46 ft. by 23 ft. 9 in. The vessel is built of steel to Lloyd's highest class under special survey, and is of the single deck type, with large bulb angle frames, which give the vessel clear holds and especially adapt her for bulk cargoes. She has poop, bridge and forecastle, and is rigged as a fore-and-aft schooner, with telescopic masts to Manchester Ship Canal requirements. She is also fitted with water-ballast in double bottom fore and aft and in peaks, and all the latest improvements. The deck machinery consists of four large double-powered steam winches, patent direct steam windlass, steam steering gear, large Meredith donkey boiler, etc. The engines are being fitted by Messrs. Robert Stephenson & Co., Limited, Newcastle-on-Tyne, the size of the cylinders being 22 in., 36 in. and 60 in., by 42-in. stroke, two large boilers working at 160 lbs. pressure. The

vessel has been built to the order of Messrs. Macbeth & Gray, Glasgow, and under the superintendence of Mr. David Taylor. The christening ceremony was gracefully performed by Mrs. Captain Swanson.

Bruxellesville.—On Wednesday, October 27th, Sir Raylton Dixon & Co., Limited, launched from their Cleveland Dock-yards, Middlesbrough, the handsomely modelled mail and passenger steamer, *Bruxellesville*, built for Messrs. Woermann, of Hamburgh, to run in the Belgian Mail Line between Antwerp and the Congo, and similar to the steamers *Albertville* and *Leopoldville*, lately built by Messrs. Dixon for the same line. The dimensions of the vessel are :—Length, 364 ft.; beam, 44 ft.; depth, moulded, 26 ft. Accommodation will be provided in most spacious and handsomely fitted cabins for 100 first-class and 60 second-class passengers, with large dining-room panelled in marble and inlaid woods, in house on deck. The first-class smoking room, second-class smoking room, and cabin entrances will be elaborately fitted and decorated, and the vessel will be lighted throughout with electric light. A powerful refrigerating machine with large cooling chambers will also be provided for the conveyance of fresh meat, provisions, etc. Triple-expansion engines will be fitted by Messrs. T. Richardson & Sons, Limited, Hartlepool, having cylinders, 27 in., 43 in., 72 in. by 48 in. stroke, supplied with steam by three large double-ended boilers, working at 180 lbs. pressure, which it is expected will give a speed of 13 knots an hour. On leaving the ways the vessel was gracefully named *Bruxellesville* by Miss Dixon, of Croydon, niece of the builder.

Sultan Van Langkat.—On October 27th this vessel, built by Sir James Laing, Deptford Yard, Sunderland, to the order of the Royal Dutch Petroleum Co., was successfully launched from the builder's yard, and was christened, *Sultan Van Langkat* by the Countess de Lessepes. The dimensions of the vessel are :—285 ft. long; 39 ft. 6 in. beam, and 23 ft. 7 in. moulded depth, with engines 24 in., 40 in., 64 in. by 42 in., supplied with steam by two large single-ended boilers. She is constructed on the most modern plan for the carriage of both bulk oil and general cargo, and has been superintended during construction by Messrs. Flannery, Baggallay & Johnson, of London and Liverpool. The vessel is built to the highest class at Lloyd's and the Verceniging Van Assuradenron, of Amsterdam, and has very complete appliances for the discharge of cargo, being fitted with two large pumps for the discharge of same, and with seven steam winches, supplied with steam from a large Marine type donkey boiler, for the discharge of general cargo. She is also fitted for burning liquid fuel both in main and donkey boilers, the bunkers being specially arranged for this purpose; and has a complete installation of electric light, and everything that can conduce to economy in working the ship.

Perth.—On October 27th Messrs. Austin & Son, Limited, launched at Sunderland the steel screw steamer *Perth*. Her deadweight carrying capacity will be about 2,500 tons, and the vessel will be classed 100 A1 at Lloyd's, under special survey. Her machinery, which will be supplied by Messrs. John Dickinson & Sons, Limited, will be of the tri-compound type. She has been constructed to the order of the Melbourne Steamship Co., of Melbourne, for their inter-colonial trade between Melbourne and Perth, and for general trades.

Enfield.—On October 27th, there was launched from the yard of Messrs. John Priestman & Co., Southwick, a handsome steel screw self-trimming cargo steamer, built to the order of Messrs. C. W. Ormston & Co., Newcastle-on-Tyne, and is of the following dimensions :—Length, 298 ft. 6 in.; breadth, 40 ft.; depth, moulded, 21 ft. 4 in. She is the second vessel built on the builder's patent self-trimming principle, the first vessel of this type, the *Unique*, having, it is stated, proved an unqualified success. The chief merits claimed are reduction of net tonnage, saving of trimming charges, and excellence of sea qualities. The vessel will receive Lloyd's highest class, and is fitted with all the latest improvements for the rapid working of cargoes. Messrs. Wm. Allan & Co., Limited, are supplying the engines and boilers. The engines are of the triple-expansion design, having cylinders 21 in., 35 in., and 58 in. diameter, with a stroke of 39 in. The launch was in every way successful, the vessel receiving her name, *Enfield*, from Miss Freda Willson, of Gateshead-on-Tyne.

Marian.—On October 27th there was launched at North Shields a steel steam ketch of about 150 tons, named the *Marian*, for the Hartlepool Steam Fishing Co., Limited, of West Hartlepool.

La Canche.—On October 27th there was launched at Beverley an iron steam ketch of about 150 tons, named the *La Canche*, for Vider Freres, Boulogne.

Harperley.—On October 29th Messrs. R. Craggs & Sons launched at Middlesbrough, to the order of Messrs. Furness, Withy & Co., Limited, of West Hartlepool, for Messrs. J. & C. Harrison, London, E.C., a steel screw steamer of the following dimensions :—Length, 310 ft. over all; breadth, extreme, 43 ft.; depth, moulded, 23 ft. Triple-expansion engines are being supplied by Messrs. Wm. Allan & Co., Limited, Sunderland, having cylinders 23 in., 37½ in., and 61½ in. by 39 in. stroke, with two single-ended steel boilers. She was christened *Harperley*, and is expected to carry about 4,000 tons on about 19½ ft. draught.

Privateer.—On October 30th Messrs. Willoughby Bros., Limited, launched at the Great Western Docks, Plymouth, a steel screw tug, built to the order of Mr. George Etheredge, of Clyde House, Poplar, London. Her principal dimensions are :—Length, 91 ft. 6 in.: beam, 18 ft.: depth, 10 ft. 6 in. She is built to Lloyd's highest class. The engines are compound surface-condensing, with cylinders 17 in. and 34 in. diameter respectively, stroke 21 in. She was christened the *Privateer*.

Pembroke Castle.—On November 8th Messrs Edwards Bros. launched at Shields for the Castle Steam Trawling Co., Limited, the steam trawler *Pembroke Castle*, a vesselof 150 tons gross.

Consent and Contest.—On November 10th and 11th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, two steel barges of the following dimensions, viz.:—Length, overall, 82 ft. 6 in.; beam, moulded, 22 ft. 6 in.; depth, moulded in midships, 8 ft. 2½ in., and with a carrying capacity of about 230 tons. The vessels have been built to the order of Joseph Constant, Esq., Fenchurch Street, London, and were christened *Consent* and *Contest* respectively, on leaving the ways.

Nith.—On November 11th Messrs. Williamson & Son, shipbuilders, Workington, launched a coasting steamer, which was christened the *Nith*. Its carrying capacity is about 280 tons, and is built for Messrs. Carr & Co., Limited, of Carlisle, for their local service. After the steamer is rigged she will be towed to Govan, to be fitted with her engines.

Venetia.—On November 15th a steel screw steamer was launched from Messrs. Short Bros.' shipbuilding yard at Pallion, Sunderland, to the order of Messrs. Gow, Harrison & Co., Glasgow. The vessel is of the following dimensions, viz.:—Length, between perpendiculars, 352 ft.; breadth, 45 ft.; and depth, moulded, 27 ft. 9 in.; and is a fine type of naval architecture. She has been constructed of Siemens-Martins steel to the highest class in the Bureau Veritas and the British Corporation. She has an open poop, and long bridge amidships, on the top of which houses have been erected for the saloon and cabin accommodation, with wheel and chart-house on flying bridge. The crew are berthed in the topgallant-forecastle, which is very commodious. The double bottom fore and aft, which provides ample water ballast, is divided for trimming purposes. There are six steel bulkheads with four cargo holds, having powerful steam winches for the rapid loading and discharging of cargoes, steam being supplied for driving the winches by a very large multitubular donkey boiler, placed in the stokehold, the steering engine is placed in the engine-room, with controlling rods to wheel-house on flying bridge. Triple-expansion engines will be fitted by Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, having cylinders, 24 in., 39 in. and 66 in. respectively, with a stroke of 42 in., steam being supplied at 180 lbs. working pressure by two large steel boilers, fitted with forced draught with all the latest appliances in marine engineering. The christening ceremony was performed by Miss Bertha Short, of Ashbrooke Hall, who named the vessel *Venetia*.

LAUNCHES.—Scotch.

Umballa.—On October 7th there was launched at Dumbarton a steel schooner-rigged steamer of about 5,288 tons, named the *Umballa*. She is owned by the British India Steam Navigation Co., Limited.

John Irwin.—On October 14th a steel schooner-rigged steamer of 310 gross tonnage, named the *John Irwin*, was launched at Paisley. She is owned by the Hylton Colliery Co., Limited, Dundalk.

Jedburgh.—On October 15th a steel yawl-rigged steamer, of 165 gross tonnage, named the *Jedburgh*, was launched at Glasgow. She is owned by Messrs. Hagerup, Doughty & Co., Limited, Grimsby.

Kilmarnock.—On October 15th a steel steam trawler, of 165 gross tonnage, named the *Kilmarnock*, was launched at Glasgow. She is owned by Messrs. Hagerup, Doughty & Co., Limited, Grimsby.

Ilfracombe.—On October 15th a steel schooner-rigged steamer, of 165 tons gross, named the *Ilfracombe*, was launched at Glasgow. She is owned by Messrs. Hagerup, Doughty & Co., Limited, Grimsby.

Agincourt.—On October 26th there was launched at Dundee a steel schooner-rigged steamer named the *Agincourt*, for the Shipping Investments Co., Limited, Hull.

Logic.—On October 26th Messrs. Barclay, Curle & Co., Limited, launched from Clydeholm Shipyard, Whiteinch, on the Clyde, a smart twin-screw cargo and passenger steamer, built to the order of the Belfast Steamship Co., Limited, for their cross-Channel trade between Belfast and Liverpool. The general dimensions are 236 ft. by 31 ft. by 16 ft. 6 in., with poop, bridge, shelter, and forecastle decks, and a promenade deck over bridge deck. She has been built to class 100 A1 at Lloyd's, with heavier scantlings than required by rule to meet trade intended, and is fitted up with cellular double bottom for water ballast, as well as all the most modern appliances for rapid and efficient handling of cargo. The saloon, cabins, and smoke-rooms are fitted up in a very artistic manner for about 30 first-class passengers, in addition to which there are cabins for deck and steerage passengers. A complete electric light installation with special cargo lamps, &c., has been fitted up by Messrs. Holmes & Co., of Newcastle; the steering gear is a combined steam and hand gear fitted direct on rudder head. A special feature is the fittings for the conveyance of live cattle between trading ports, all available space having been fitted for cattle, sheep, and horses, and the 'tween decks being of lofty construction for this purpose and ventilated by mechanical means. The machinery consists of two sets of triple-expansion engines, supplied with steam from large boilers, with fans, and all latest improvements for efficiency and economy, and are capable of driving the vessel about 14 knots. As the vessel left the launching ways she was very gracefully named the *Logic*, by Miss Gallaher, of Green Castle, Belfast, daughter of the chairman of the Belfast Steamship Co. After the launch the guests adjourned to the model-room, where lunch was served. On the berth vacated by the *Logic*, Messrs. Barclay, Curle & Co., Limited, immediately proceed to lay the keel of H.M. tug *Diligent*, for Dockyard service.

Arana.—On October 28th Messrs. A. Rodger & Co. launched at Port-Glasgow, a finely-modelled steel screw steamer for Messrs. Robert MacAndrew & Co., London. The vessel is of the following dimensions:—Length, 238 ft.; breadth, 34 ft.; depth, 23 ft. 4 in.; gross tonnage, about 1,480 tons, and carrying capacity 2,350 tons deadweight. She was built under the superintendence of Mr. John Kennedy, London, assisted by Mr. P. Bartlett, and is intended for Messrs. MacAndrew's Spanish trade. She was named *Arana* by Miss Kennedy, of Kilmarnock, and will be engined by Messrs. Hall-Brown, Buttery & Co., Govan.

Carisbrooke Castle.—On October 28th was launched the *Carisbrooke Castle*, a screw steamer of about 7,500 tons gross and 8,500 I.H.P., built for the South African Royal Mail Service of the Castle Line, from the yard of the Fairfield Shipbuilding and Engineering Co., Limited. The vessel, which will be the largest in the company's fleet, is 500 ft. long over all, and 480 ft. on the water line. Her extreme breadth is 56 ft., and her moulded depth 35 ft. 6 in. The hull is built of steel, to the requirements of the Board of Trade for foreign-going passenger steamers, and the construction has been under the special survey, and with the scantlings required by Lloyd's latest rules for the 100 A1 class. There is a cellular double bottom the full length of the ship, and the holds have been subdivided into separate compartments by watertight bulkheads, which are constructed and arranged with the object of meeting the recommendations of the Bulkhead Committee. When completed the vessel will accommodate about 250 first-class passengers amidships, 150 second-class aft, and about 220 third-class forward. The cabin accommodation is of a lofty and commodious description, and is chiefly on the main, upper, and bridge decks. On the latter deck are some single-berth state-rooms, and also several cabins for officers and engineers. The entrance to the part of the ship set apart for the first class is in the middle of the vessel, forward of the funnel, and leads direct to the dining-saloon. The saloon will be panelled in oak, and will have a handsome domed cupola in the centre, with electric ventilating fans. A supplementary or children's dining-saloon, furnished with chairs with elevating seats, adjoins the main saloon entrance. The drawing-room is on the forward part of the promenade deck, and is entered from the main staircase. This apartment, lofty and spacious, will be panelled with inlaid mahogany, and provided with elegant cabinets, lounges, easy-chairs, and writing-tables. The smoking-room is at the after end of the first-class promenade deck, and from it there will be convenient communication with the decks below. The second-class dining saloon is on the main deck aft. The smoking-room for the same class is on the poop. The third-class accommodation is forward; the berths being arranged in rooms around a dining saloon. The quarters of all the classes are heated by means of steam pipes fitted with valves, so placed that a desirable temperature may always be maintained. The question of ventilation has been very carefully studied, and a most complete system adopted; electricity is brought to bear in the ventilation of saloons, corridors, and sleeping cabins in the 'tween decks by the adoption of a large number of electric fans. The lavatories, pantries, &c., are provided with patent ventilating side scuttles, which are so arranged that they can be kept open in bad weather when ordinary ports have to be closed. A continuous service of hot and cold fresh-water and hot and cold sea-water will be supplied. An extensive and complete installation of electric light will be fitted, the generating plant consisting of three independent sets of engines and dynamos, and there will be electric bells in all the sleeping cabins and saloons. The cargo hatches will be equipped with eight steam winches for the despatch of cargo, while an additional steam winch will be provided for hoisting the boats. A full outfit of boats and life-saving appliances, and all other details required by the Board of Trade, will be on board. The steam steering engine is Brown Bros. & Co.'s steam tiller, placed aft, and controlled from the bridge by telemeter, while reserve hand gear and steering wheels are in the house on the top of the poop. A Napier's steam windlass, with self-holding brakes and capstan, will be placed on the forecastle deck, adapted for the cables, which are 2⅞ in. diameter, and for the heavy anchors, which are made of nickel steel. Two powerful steam warping capstans, with separate engines, will be on the poop deck. The propelling machinery consists of four cylinders and four crank quadruple-expansion engines, balanced on the Yarrow, Schlick, Tweedy system. The right to use this particular type of engine has been acquired by the company because of the advantages it affords in reducing the vibration of the ship. The improvement adds greatly to the comfort of passengers, while at the same time it considerably lessens the risk of an entire breakdown of the machinery. The engines are the largest on the quadruple-expansion principle which have yet been constructed balanced on this system. The boiler pressure is 205 lbs. per square inch, and the machinery has been designed with a view to obtaining the maximum economy of fuel practicable with this high pressure, combined with high speed. The shafting is of Whitworth steel of a diameter considerably in excess of Board of Trade requirements. The pistons are also of Whitworth steel. The connections throughout the machinery have been duplicated and designed with a view to reduce to a minimum the chance of complete failure of any vital part. See's hydro-pneumatic ash ejectors are fitted in the stokeholds, and the absence of noise from ash hoists will add to the comfort of passengers. Special attention has been given to reducing noise and vibration in the engine-room, centrifugal pumps, driven by electric motors which are absolutely noiseless, being adopted for the hot and cold sea-water supply to the baths, the sanitary service, &c. Fresh-water distillers, in duplicate, of the most approved type are fitted, capable of producing 16,000 gallons of pure cool drinking water per day. The refrigeration machinery is by Messrs. J. and E. Hall, Limited, and consists of one of their C.02 machines of very ample power, and of the duplex type, which practically ensures freedom from the risk of failure of the machine. In addition to the cold chambers proper there is an extensive installation of cold larders, ice-making plant, and wine-cooling chambers; also water coolers in the first, second, and third class accommodation, as well as

in the smoking-room bars. There is, in fact, a service of drinking water laid on fore and aft in the ship at about the temperature of melting ice, and this is independent of the practically unlimited supply of ice to the first, second, and third class tables. Mrs. Mirrielees was to have performed the launching ceremony, and with her was to have been associated her daughter, but the illness of the younger member of the Currie family necessitated a change, and Mrs. Wiseley, another of Sir Donald's daughters, took the place of her sister. Even for Fairfield the launch was a pretty one, and the vessel left the ways amidst loud cheers. Afterwards the builders entertained the launch party at luncheon in the drawing office.

Ceratodus.—On October 29th Messrs. Fleming & Ferguson, Limited, shipbuilders and engineers, Paisley, launched from their yard a powerful sand pump hopper dredger, built to the order of the Government of Queensland. She will be capable of raising 500 tons of sand and gravel from a depth of 30 ft. below water-line, and will have hopper-carrying capacity of 7,500 cubic feet. The vessel is provided with all modern appliances for convenient and expeditious working. As she left the ways she was named *Ceratodus* by Miss May Fleming, Elmhurst, Langbank.

Crocodile and Dromedary.—On November 3rd Messrs. Russell & Co., Port-Glasgow, launched two steel towing hopper barges, named *Crocodile* and *Dromedary*, for Mr. Joseph Constant, London. The dimensions are:—Length, 167 ft.; breadth, 35 ft. 6 in.; depth, 13 ft. 9 in. They are each 685 tons net register, and are the first of six being built by Messrs. Russell & Co. for same owners.

Clara.—On November 3rd there was launched at Glasgow for Mr. Adam Burrell, a steel steam ketch, named the *Clara*.

Empress.—On November 8th Messrs. J. Fullerton & Co., launched at Paisley, for Mr. Alexander King, of Belfast, the steamer *Empress*, a vessel of 500 tons gross.

Scott.—On November 8th Messrs. Scott & Sons, Bowling, launched from their shipbuilding yard a screw steamer of the following dimensions, viz.:—180 ft. by 29 ft. by 13 ft., which they have built to the order of Mr. J. A. Larsen, of Skien, Norway. Messrs. Ross & Duncan, of Govan, are supplying the machinery. On moving down the ways the vessel was named *Scott* by Miss Janet C. Scott, Dunarbuck, Bowling.

Aphrodite.—On November 8th there was launched from the shipbuilding yard of Messrs. Russell & Co., Port-Glasgow, a steel spar-decked screw steamer of the following dimensions:—Length, 345 ft.; breadth, 49 ft. 9 in.; depth, 28 ft. 6 in., carrying 6,250 tons deadweight on Board of Trade freeboard. The vessel is being supplied with machinery by Messrs. Rankin & Blackmore, Eagle Foundry, Greenock, and is also fitted up with all the latest and most modern appliances for the rapid handling of cargo. She has been built to the order of Mr. John Lockie, Newcastle-on-Tyne, and makes the fourth which this firm have built for the same owner within the last eighteen months. She has been superintended during construction by Captain James Morgan, who will command her. As the vessel left the ways she was gracefully named the *Aphrodite* by Mrs. Morgan, wife of the commander. After lunch the *Aphrodite* was towed to the Victoria Harbour, where her engines will be put on board.

Mary Park.—On November 9th there was launched from the yard of Messrs. Anderson, Rodger & Co., a finely modelled steamer of 5,750 tons capacity, to the order of the Park Steamship Co., and to the highest class of the British Corporation. The steamer was named the *Mary Park* by Mrs. R. Ballantyne Park, mother of the managing owner. After the launch the vessel was towed to Glasgow, where her machinery will be supplied by Messrs. Dunsmuir & Jackson.

Arabia.—On November 10th Messrs. Caird & Co. launched at Greenock the magnificent steel screw steamer *Arabia*, which they have built for the mail and passenger service of the Peninsular and Oriental Steam Navigation Co. The *Arabia*, which is a sister ship to the *Egypt*, launched in May last, is of the following dimensions:—Length, 500 ft.; breadth, 54 ft.; depth, 37 ft. 6 in.; and 8,000 tons register. The builders will supply triple-expansion engines of 11,000 effective H.P., having four cylinders and four cranks, and capable of propelling the vessel at a high rate of speed. The christening ceremony was performed by Miss Dora Barnes, daughter of Mr. Frederick Dallas Barnes, one of the managing directors of the P. & O. Co. Modelled on beautiful lines, and constructed of the finest material, the *Arabia* is one of the largest vessels the P. & O. Co. are possessed of. Constructed in accordance with Lloyd's 100 A1 class, she will carry 500 saloon passengers, whose comfort and convenience have been studied in every way.

Bavaria.—On November 11th there was launched from the yard of Messrs. D. & W. Henderson & Co., Partick, a handsomely modelled steel screw steamer, which they have constructed to the order of Messrs. Henderson Bros. for their Eastern trade. This latest addition to the large fleet of Anchor Line vessels is, in length, 416 ft.; breadth, 49 ft. 2 in.; with a depth of 30 ft. 9 in.; having a gross tonnage of about 4,740 tons, and will be classed in British Corporation. She has been fitted with all the latest improvements to ensure the rapid and safe working of the large cargo which she has been designed to carry, including 10 powerful winches by Messrs. Clarke, Chapman & Co., and also large derricks fitted at the hatches. Steam steering gear, by Davis & Co., London, is fitted amidships, and a complete installation of electric light has been fitted throughout the vessel by Messrs. W. C. Martin & Co., including a searchlight for navigating the Suez Canal at night. The saloon and officers' accommodation is on the bridge deck. A chartroom and wheelhouse have been built on the navigating bridge, while a lookout bridge is placed above this to give every facility to the officers in the navigation of the vessel. A set of triple-expansion engines will be supplied and fitted by the builders, having cylinders 26 in., 43 in., and 71 in. diameter by 4 ft. stroke. As the vessel left the ways she was gracefully named *Bavaria* by Mrs. Wm. Coverly, New York.

Tartar.—On November 13th Messrs. J. & J. Hay, Limited, Kirkintilloch, launched from their boatbuilding yard a steamer for their coasting traffic. Owing to the engineering strike the launch had been delayed six weeks, as the engines could not be got sooner. As the vessel left the ways she was christened *Tartar* by Miss Davie, daughter of Mr. Robert Davie. The dimensions are 66 ft. by 18 ft. by 9½ ft., and the carrying capacity over 100 tons. The engines, built by Messrs. Ross & Duncan, Govan, are of the surface-condensing type, the cylinders being 10½ in. and 20 in., with 15 in. stroke.

Tourmaline.—On November 13th there was launched from the shipyard of Messrs. John Shearer & Son, Kelvinhaugh, a handsome screw steamer, built to the order of Mr. William Robertson, Glasgow, for his well-known "Gem" Line. Her dimensions are:—200 ft. by 30 ft. by 14 ft. 2 in., moulded, with a carrying capacity of about 1,200 tons. She is to be fitted with triple-expansion engines, steam steering gear, patent windlass, and all the latest appliances. On leaving the ways the vessel was named *Tourmaline* by Miss Mary Irene Lennard, of Enfield Lodge, Blackheath, London.

LAUNCH.—GERMAN.

Octavia.—On October 19th was launched a new passenger steamer built by the Flensburg Shipbuilding Co. for the Hamburg Pacific Line. Her dimensions are:—394 ft., 48 ft., 30 ft. The triple-expansion engine, 1,800 H.P., is being finished by the Flensburg Shipbuilding Co.

TRIAL TRIPS.

Noord Holland.—On November 2nd the *Noord Holland* was taken on trial off Troon. She is now owned by the Steam Coal Co., of Rotterdam, and is intended for the coal trade between this country and the Continent, and is of the following dimensions:—230 ft. by 34 ft. extreme beam by 17 ft. 3 in. moulded, and is designed to carry about 1,750 on 15 ft. 9 in. draught. She is fitted with steam windlass, steering gear, and four winches. The engines are 17 in., 27½ in., and 44 in. by 33 in. stroke, and take steam from one large single-ended boiler. She has a large donkey boiler. The trial was supervised by Mr. Wallace, of the Ailsa Shipbuilding Co.; the builders, Mr. Houston, of Messrs. Muir & Houston; the engineers, Captain Schmidt, the marine superintendent of the Steam Coal Co., and Mr. Baggallay, of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, consulting engineers to the owners. The weather was hazy with a good breeze and smooth sea, and the vessel attained a speed of over 10 knots, the engines running very well.

Mayflower.—On November 2nd the s.s. *Mayflower*, recently

launched by the Ailsa Shipbuilding Co., Troon, for Messrs. T. L. Duff & Co., of Glasgow, ran her official trials in the Firth of Clyde. Her dimensions are:—230 ft. by 33 ft. 10 in. by 17 ft. 3 in. moulded depth, and her machinery consists of a set of triple-expansion engines, 17 in., 27½ in., and 44 in. by 33 in. stroke, fitted by Messrs. Muir & Houston, Glasgow. This vessel has just been sold to the Scheepoort en Steenkolen Matchappij, of Rotterdam, who were represented at the trial by Captain Schmidt, superintendent of the company, and Mr. Baggaly, superintendent engineer. The trials were thoroughly satisfactory to all concerned, the machinery having worked without a hitch, and a mean speed of fully 10 knots per hour was maintained.

Cambria.—On November 4th and 6th the new twin-screw steamer *Cambria*, built by Messrs. Wm. Denny & Brothers, Dumbarton, for the Holyhead and Dublin service of the London and North-Western Railway Co., ran her trials on the Clyde preliminary to entering upon the extended trials which the vessel has to pass through before taking up her position on her line. After the first trial was run, and the screws being changed, the second was undertaken. The results in both cases were highly satisfactory, the mean of the runs on the measured mile at Skelmorlie being 21½ knots.

South Africa.—On November 5th the steamer *South Africa* left the shipbuilding yard of Messrs. Short Brothers for her trial trip, which proved in every way satisfactory. After adjustingcompasses a series of runs was made over the measured mile, and a mean speed of 12½ knots was attained. Her dimensions are:—Length, 352 ft.; breadth, 45 ft.; moulded depth, 27.9 ft.; and she will carry 5,800 tons deadweight. Special attention has been given to the arrangement of the upper and main decks to enable a large number of cattle to be carried. Her engines are by Messrs. W. Allan & Co., Limited, of Sunderland, and have cylinders of 25 in., 40 in., and 67 in., by 45-in. stroke, with large boilers working at 180 lbs. pressure, and fitted with forced draught. The vessel has been constructed of steel to the highest class in Lloyd's Register for the Southern Steam Shipping Co., Limited, of which company Messrs. Lawther, Latta & Co., of London, are the managers. After the trial trip the vessel proceeded to Newport to load for Rio Janeiro, under the command of Captain Dobson.

Ingeli.—On November 5th the steamer *Ingeli*, the latest addition to the fleet of Messrs. John T. Rennie, Son & Co., of London and Aberdeen, and designed to run in their direct Natal service, was taken for trial at sea at Aberdeen by the builders, Messrs. Hall, Russell & Co. She is one of the largest and most completely fitted steamers that have ever been constructed in Aberdeen. She is 342 ft. long, 41 ft. beam, and 27 ft. 1½ in. deep, and is arranged for first and second-class passengers both aft and amidships, with long promenade deck above the spar deck. The machinery has been constructed by Messrs. Hall, Russell & Co., and the engines have cylinders 25½ in., 40½ in., and 66 in. by 45-in. stroke, supplied with steam from large double-ended boilers, working at 180 lbs. pressure. The auxiliary machinery comprises powerful steam winches, windlass, and steering gear, the latter placed right aft, pumps, hoisting gear, feed filters and heaters, evaporator and distiller, freezing machinery for provisions and ice making, with insulated chambers for same. The whole worked throughout in the most successful manner on the various trials, the last being completed on November 5th, when the ship left Aberdeen for London to take her station, having on board Mr. G. Hall Rennie, the senior partner in the owners' firm (with a party of friends), and Mr. Johnson, of Messrs. Flannery, Baggallay & Johnson, of London and Liverpool, under whose inspection the machinery has been constructed.

Port Victoria.—On November 10th this vessel, built by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, to the order of Messrs. Wm. Milburn & Co., of London and Newcastle, for the Anglo-Australasian Steam Navigation Co., Limited, went on her official trial trip. The principal dimensions of the vessel are:—Length, between perpendiculars, 354 ft.; breadth extreme, 48 ft. 6 in.; depth, moulded, 25 ft. She is built to Lloyd's highest class under their special survey, with cellular double bottom right fore-and-aft, the after peak is also arranged for water ballast. She has a poop, bridge, and topgallant forecastle. The saloon accommodation is on top of the bridge, and the officers' and engineers' accommodation at the sides of the engine casings on top of the bridge, the seamen and firemen being berthed in the topgallant forecastle. She is rigged as a two-masted fore-and-aft schooner, the topmasts being made to suit the Manchester Ship Canal. Provision is made for the rapid handling of cargo by having nine steam winches and derricks, and altogether the vessel is a good specimen of a modern cargo carrier, and will carry about 5,600 tons on a very light draught. The engines were built by Messrs. John Dickinson & Sons, Limited, of Sunderland, the sizes being 24 in., 40 in., 64 in., by 45 in. stroke, supplied with steam by two large boilers at 180 lbs. pressure, arranged to work with Howden's forced draught. The engines ran smoothly throughout, and an average speed of over 11½ knots was obtained. She has been constructed under the supervision of Mr. S. Moffitt on behalf of the owners. After the trial she was taken to Blyth, and was the first vessel to enter the new dock there, the docking being witnessed by a large concourse of spectators, who favourably commented on the smart, businesslike appearance of the vessel.

Batavier III.—On November 13th the steamer *Batavier III.*, which Messrs. Gourlay Brothers & Co., of Dundee, have built for the Nederlandsche Stoomboot Maatschapptj, of Rotterdam, made her official trial trip. The speed attained was 14½ knots per hour.

Willyama.—On November 13th the new cargo steamer *Willyama* proceeded to sea on her trial trip. She has been built by Messrs. Dobson & Co., Low Walker, for the Adelaide Steamship Co., Adelaide, and is of the following dimensions:—Length, 338 ft.; breadth, 45 ft.: and 21 ft. deep. The engines, by the North-Eastern Marine Engineering Co., Limited, Wallsend, have cylinders 23 in., 38 in., and 61 in. by 42 in. stroke. During the trial the engines ran without a hitch, and the vessel on the measured mile obtained a speed of 12 knots.

Mediana.—On Wednesday, November 17th, the steel screw steamer *Mediana*, built by Sir Raylton Dixon & Co., Limited, Cleveland Dockyards, Middlesbro', to the order of the British Maritime Trust, Limited, of London, went to sea for her trials under the command of Captain Morgan. Her principal dimensions are:—Length, 325 ft.; beam, 43 ft.; depth, moulded, 22 ft. 11 in., and has a deadweight carrying capacity of over 4,200 tons on a light draught of water. She is built to British Corporation highest class, single-deck rules, and has water ballast in after peak and cellular bottom, with upper, poop, and bridge decks of steel, and five watertight bulkheads, &c. The accommodation for captain and officers is handsomely fitted up in houses on bridge deck, with engineers under the bridge, and crew in top-gallant forecastle. Triple-expansion engines have been fitted by Sir Christopher Furness, Westgarth & Co., Limited, Middlesbrough, having cylinders, 22 in., 36½ in., 60 in. by 42 in., supplied with steam by two large single-ended boilers. During the trials everything passed off most successfully and gave great satisfaction to all concerned.

Trojan.—On November 17th the *Trojan* left the Tyne for her trial trip. She has been built by the Tyne Iron Shipbuilding Co., of Willington Quay, to the order of Mr. E. C. Thin, Liverpool. This vessel is a very fine specimen of cargo vessel, and is of the following dimensions, viz.:—350 ft. by 47 ft. by 28 ft. 3 in. moulded. The engines, built by the North-Eastern Marine Engineering Co., of Wallsend-on-Tyne, have cylinders 25½ in., 41 in., and 68 in. by 48 in. stroke, and three large single-ended boilers. During the trial the machinery ran with perfect smoothness; the vessel, being partially laden with a deadweight of 2,600 tons, attained a speed of 12 knots, which was considered very satisfactory.

Russie.—On November 18th the *Russie* left the Tyne for her official speed trial trip. She has been built at Sunderland for the Societe Generale de Transports Maritimes a Vapeur, Marseilles, and is intended for the French mail and passenger service. The vessel is built to the unsinkable class at Veritas spar-deck rule, with poop, bridge and topgallant forecastle, and shade deck, and has exceedingly fine lines. The machinery has been constructed by the North-Eastern Marine Engineering Co., Limited, Wallsend-on-Tyne, and consists of a very powerful set of engines having cylinders 27 in., 46 in., and 75 in. by 45 in. stroke, and comprises all the latest improvements in marine engineering. Steam being supplied by four large single-ended boilers, working at a pressure of 190 lbs. Throughout the trial, which was of some hours' duration, the engines were run continuously without a stoppage of any kind at 95 revolutions, and the guaranteed speed of 16 knots per hour was exceeded.

Etruria.—Lately the new steam trawler *Etruria*, the latest addition to the Hull fleet, has been on her trial trip. She has been built to the order of Messrs. E. J. Williams & Co., by Messrs. Cochrane & Cooper, and engined by Messrs. C. D. Holmes & Co. The *Etruria* has been fitted with engines of 60 N.H.P., and a large steel boiler. Steaming down the Humber the speed of the vessel was tested with satisfactory results, the machinery working without a hitch.

Pluton.—Lately the official trials of the Spanish torpedo-boat destroyer *Pluton*, constructed by the Clydebank Engineering and Shipbuilding Co., Limited, to the order of the Spanish Government, have been successfully completed. The tests were watched by a Government Commission, on behalf of the Spanish Government, under the presidency of Commodore Triguero, with whom were Lieutenants Ariba, Guimira, and Vazguay, Naval Architect Talesa, and Messrs. Thomson, Gordon, and Haynes. The *Pluton* is 225 ft. long, and is thus somewhat larger than the latest class of British torpedo-boat destroyers. She is, therefore, enabled to carry a considerably greater deadweight, the actual load on board during the trials being 73 tons. The results of the trial gave a mean speed of 30·12 knots on the measured mile, and during a continuous run of 1½ hours a speed of 30.02 knots was maintained. At the conclusion of the forced-draught trial the vessel was, according to contract, run for a further period of two hours under natural draught, the speed attained being 22·7 knots, or 7·10 knot over the contract. During the tests there was a noticeable absence of vibration, and the engines worked to the entire satisfaction of the Spanish Commission.

Fridtjof Nansen.—On November 18th the new screw steamer *Fridtjof Nansen*, was taken to sea on her official trial trip. She was built and engined by Messrs. John Readhead & Sons, South Shields, for Messrs. Bergh & Hellend, and is of the improved single-deck type, classed 100 A1 at Lloyd's, under special survey, and takes the highest class in Norwegian Veritas, having poop aft, bridges amidships with accommodation for engineers, and in topgallant forecastle for crew, the captain and officers being berthed in the poop aft. The vessel has a cellular double-bottom fore and aft for water ballast, and is fitted with all modern improvements for the rapid loading and discharging of cargo, including patent stockless anchors, steam windlass, five powerful winches supplied with steam from a large multi-tubular donkey boiler, fresh water condenser, evaporator and feed heater, patent steam steering gear, and telegraph, and has telescopic masts to suit the Manchester Canal. She is also fitted with wave-subduers, and is strengthened forward for steaming through ice. She has a deadweight carrying capacity of 5,450 tons on a light draught, and Lloyd's summer freeboard Her dimensions are:—Length, 338 ft.; breadth, 47 ft.; and depth moulded, 26 ft. 4½ in. The engines are of the triple-expansion type, having cylinders 25 in., 40 in., and 64 in., by 42 in. stroke, steam being supplied by two large steel boilers, working at a pressure of 160 lbs. per square inch. On her trial the vessel was run several times over the measured mile, and averaged a speed of 11½ knots, the machinery working very smoothly, and the trial giving every satisfaction to both builders and owners.

Crest.—On November 20th the trial trip took place of the large new steamship *Crest*, built by Messrs. Wood, Skinner & Co., of Bill Quay-on-Tyne, for Messrs. Dent & Co., of Newcastle-on-Tyne. She is a fine specimen of the modern improved single-deck cargo steamer, having full poop, long bridge, and topgallant forecastle; deep framing, large hatches, and clear holds for the stowage of bulk or other cargo. Her principal dimensions are:—Length, 332 ft.; beam, 46 ft.; depth, 29 ft. 9 in.; and her deadweight carrying capacity is 4,700 tons on a light draught of water. The engines were supplied and fitted by Messrs. Blair & Co., Limited, of Stockton-on-Tees, and have cylinders 23 in., 37½ in., and 61½ in. diameter respectively, and a stroke of 39 in., steam being supplied by two large boilers. The trial was highly successful in every way, and gave perfect satisfaction to all on board.

Messrs. William Doxford & Sons, Ltd., have, we understand, contracted for two more steamers of the turret deck type of 300 ft. and 335 ft. length respectively. These vessels will both be classed with the British Corporation Registry.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

SCREW PROPELLER SHAFTS.

To the Editor of The Marine Engineer.

Sir,—The articles and letters on this question recently published in your valued paper, cannot fail to be of interest to marine engineers. It is surely not to our credit to have the fact published that 90 per cent. of accidents to shaftings occurred to tail shafts. To my mind, the ordinary stern tube, with the usual lignum vitæ bearing, is an ignorant and obsolete idea that should have gone to Davy Jones long ago, with the many good ships that have gone there through the breaking of shafts.

Many times I have seen vessels docked for bottom cleaning and coating, the surveyors having the usual look round. The engineer makes a wedge to show wear at outer end of stern bush, this probably measures one-eighth of an inch. The average surveyor will pass one-eighth. (The old saying:—It would be a pity to spend £25 on such a trifle). Then what happens—Given a stern tube, 14 ft. long, with the shaft working true at after tunnel bearing and stern gland, a cast-iron propeller, 3½ tons, and the stern bush down one-eighth (later on three-sixteenths). What strains are on that shaft during a gale at sea, with the vessel in ballast trim, can be more easily imagined than described.

The shaft should never be exposed to sea-water. The liner should fit into a recess at fore end of boss, and butt against a I.R. ring. The stern tube should be kept as short as possible, so that a liner of seven or eight feet will pass through.

The inner flange of tube can be secured to a deep floor-plate in A.P.T. The stern bush to be dealt with inside by removing a portable stuffing-box. I have seen a similar device patented by engineers in the North of Ireland, where the stern bush can be adjusted with an expenditure of less than £2. Surely it would be folly to float a vessel out of dry dock with the shaft 1-11th n. down, when it can be adjusted for this small sum.

The idea of scolloping the end of liner and similar devices (based on the assumption that two small sores are better than one big one), are feeble attempts to pass over a difficulty which confronts the marine engineer, and cannot fail to be noticed by our employers. Many times, I have had to chip from one to three inches off the inner end of liners, through sea-water getting under and corroding the shaft, leaving the liner end loose.

Two points must be considered. First, to keep sea-water from the shaft, and second, to keep the bearing properly adjusted same as any other bearing. Until this is done, the 90 per cent. will stare us in the face.

Apologising for trespassing on your space,

I remain, dear Sir,

Yours, &c.,

Dundalk, Ireland, *November 20th*, 1897. Stern Gland.

STANLEY *v.* THE MAGNOLIA ANTI-FRICTION METAL COMPANY OF GREAT BRITAIN.

To the Editor of The Marine Engineer.

Dear Sir,—With reference to the recent case—"Stanley *v.* The Magnolia Anti-Friction Metal Co., of Great Britain," heard at the Manchester Assizes before Mr. Justice Bruce and a special jury, and which was decided on November 13th, in the plaintiff's favour, would you allow me to point out to prevent a natural misconstruction, that the defendant Company was a partnership composed of John Sugden, John Lulham Pound, and Max Wagner, which has been dissolved as long since as July, 1896. The action was not against the Magnolia Anti-Friction Metal Company of Great Britain, *Limited*, with whom I am now connected, and *who only* are empowered to supply the original and only genuine Magnolia Metal. As the similarity in the firms' titles might do the latter Company an

injury, will you kindly mark the distinction by publishing this letter. Yours faithfully,

32, Victoria Street, Manchester. ERNEST F. STANLEY.
November 16th, 1897.

Review.

Valve and Valve Gearing; a Practical Treatise. By Charles Hurst. London: Chas. Griffin & Co., Ltd. 1897.

MR. HURST'S book is designed for the use of students, engineers, and draughtsmen. It is intended as an aid for those who are engaged in the designing of machinery, and by means of diagrams shews the working of the various types of valves and gearing, and thus enables those who refer to it to arrive at the right proportions of which to make their machinery for the particular work they may have in view. The book is divided into two parts, and of these the first deals with the ordinary slide valve as a starting point. Following upon this the subjects of balanced valves and trick and piston valves are gone into. The mode of constructing the Zeuner diagram is explained, and also the method of applying it to the cases which are met with in practice. Then the author's course naturally proceeds to slide expansion gears and link motions. A chapter on the modern kinds of radial gear completes the first part. The second part deals with Corliss valves and matters therewith connected. It will be seen that the whole field covered by the somewhat comprehensive title of the book is gone over by the author. Most large systems, like big railway companies, have their own peculiar methods of designing the details of their machinery, and many of these semi-private arrangements are explained and illustrated here. Thus we find Allan's straight link motion (which is a combination of the shifting and stationary link gears), Gooch's motion, which is adopted on the Great Western Railway, and several others, all gone into. Whilst on this point occasion is taken to give a crank pin diagram to shew the action of the gear, and thus enable alterations and improvements to be made in the setting of the valves when desirable. Amongst the radial gears, Joy's, Hackworth's, and Bremme's are dealt with, and the conclusion arrived at that, whilst Joy's is the better of the two for locomotive practice, the marine engineer will find Bremme's the best adapted for his work. This conclusion is based upon considerations of arrangements in connection with the other parts of the machine. The Bremme gear makes less movement in working than the other, and thus saves space in the engine-room, and obviates any risk of the parts striking the engineers in charge where room is limited. Mr. Hurst closes this part of the work with an expression of his opinion that, though objection is made to the use of radial gears because of their multiplicity of parts in wear, if properly made in the first instance—a condition which ought to be fulfilled in every case of machinery construction—they will last quite as long as the link motions. The same thoroughness of research and clearness of explanation is noticeable in the second part of the volume. We feel sure that the book will be largely sought after by students and designers, and that it will prove a very valuable aid to them in their work and tend to the production of engines of scientific designs and of economical working.

Cyclops Cement.—Messrs. R. & J. Rankin, of Union Foundry, 22, Manchester Street, Liverpool, have placed on the market a cement which is applicable for stopping leaks in high-pressure steam boilers, tanks, &c., and preserving inside bottom plates of boilers, rivet heads, seams, &c., from corrosion. It is recommended particularly as a cement in connection with leakages in steam boilers caused by unequal expansion and contraction, corrosion, &c., and to preserve plates, rivet heads, seams, &c., from rust. It is also applicable for tank work, and for many purposes for which ordinary cements are useless. They also manufacture a fire-proof cement, which is suitable for applying at the back ends of furnaces to preserve the plates where the flames strike them, also stay nuts, &c., from being burnt away. It is prepared as a dry powder and put up in packages to be used as required, and is thus always ready for use. We understand that they have been tried by some of the large steamship companies, who have reported most favourably, the fire-proof cement being the only kind that has stood the severe heat to which it is exposed in the furnaces, out of all the various preparations hitherto tried. Repeat orders have been sent in by several firms.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from October 6th to November 10th, 1897.

22842 E. Seger. Floats of steam turbines.
22880 W. P. Bullivant. Torpedo net defences.
22881 S. Frank. Connecting metal tube ends.
22886 J. R. Churchill and F. G. Seeley. Friction clutch.
22889 J. Klein. Mechanical feed lubricators.
22921 W. Whittaker. Mechanical stokers.
22923 A. Grant. Water-gauge for steam boilers.
22926 P. H. Clarke. Compositions for steam packings.
22956 A. F. E. Dupont. Water-tube boilers.
22963 I. C. Griffith. Balanced slide valve.
22976 A. J. Waggett. Construction of model boats.
23003 B. Haigh. Propeller.
23020 D. P. Mumm. Sounding apparatus.
23022 E. A. Catchpole. Crank for transmission of power.
23030 Tangyes, Limited, and J. N. Floyd. Steam pumps.
23066 E. Roesler. Cleaning the tubes of steam boilers.
23081 C. H. Wilson and W. B. Thompson. Utilising induced draught.
23084 D. Morell. Rotary pumps.
23095 R. T. Love. Direct-acting engines.
23110 H. S. Maxim. Superheating steam.
23141 A. J. Boult (F. Wangelin, Germany). Floats.
23152 B. J. B. Mills (E. Jolicard, France). Water-tube boilers.
23157 W. Chambers. Turbines.
23171 A. S. Mills. Supplying fuel to boilers.
23201 C. Hellyer and C. W. Wilkes. Metallic packing.
23206 D. R. Carter. Valve gear of steam engines.
23220 J. Clegg. Steam engine governors.
23238 J. G. Dunlop. Water-tube boilers.
23242 J. G. Schmidt. Water tube boiler.
23261 J. H. W. Stringfellow. Propelling boats, &c.
23288 J. Y. Johnson (La Société Universelle des Emulseurs de Vapeur, France). Steam boilers.
23414 A. Allan. Turbines.
23424 J. and T. Clegg. Motion for steam engines.
23454 H. H. Lake (T. J. Kieley and F. T. Mueller, United States). Damper regulating apparatus for steam boilers.
23501 E. M. T. Boddam. Combined shell and torpedo.
23507 G. M. Marchant. Shields for water-gauges.
23508 W. H. Gowdy. Water-tight doors.
23546 M. Heydrich. Bearings.
23580 M. Willenius. Sheathing propeller shafts.
23582 W. D. and S. Priestman, and H. Richardson. Engines.
23585 J. Mohs. Valves.
23588 F. H. Storm. Vessel-propelling apparatus.
23613 W. Gminder. Metallic packing ring.
23615 E. C. Johnston, E. Crompton, and J. T. Cochran. Steering gear for ships.
23616 E. C. Johnston, E. Crompton, and J. T. Cochran. Winch.
23683 E. Kaselowsky. Steering devices for torpedoes.
23703 A. C. Twigg. Lubricators.
23706 J. Rotherham. Lubricators.
23710 R. J. Threlfall and G. B. Bowles. Bearings.
23727 J. J. Moody, A. J. Hayton, and J. Donald. Construction of couplings for shafts.
23777 J. Sampson. Steam generators.
23819 T. Blisset. Coaling ships.
23889 W. Wallace. Hooks for the rigging of ships.
23956 S. Miller. Engine governors.
23966 W. G. Hannah. Marine engine governors.
23980 W. H. Cranstone. Friction clutch.
23984 A. C. Davey. Hank-hook for sails.
23994 T. J. Kennedy. Anti-friction bearing.
23995 L. A. Letombe and F. Mollet-Fontaine. Motive power engines.
23996 E. A. Blanton, jun. Couplings for shafts.
24011 C. McCann. Water-gauge for boilers.
24030 W. W. Sheriff. Steam boiler furnaces.
24071 C. and T. H. Tennett, and A. J. Riley. Boiler valve.
24058 J. Butterworth. Pistons.
24064 L. Mauny. Hydrostatic marine motor.

24102 E. Edwards (F. Beil, Austria). Motive power engines.
24113 F. von Grubinski. Turbine.
24137 A. B. Blackburn and G. W. Fairall. Bearings.
24148 A. Fusenot. Navigable vessel.
24162 W. Chambers. Turbines.
24165 G. J. Ayling. Oars, propellers, and rudders.
24214 J. Porter and A. Bates. Bearings.
24263 Vickers, Sons, & Co., Ltd., A. T. Dawson, and G. T. Buckham. Moving guns on ship-board.
24280 S. Hart and E. Guitton. Steam boilers.
24310 O. Meredith. Furnaces and flues for steam boilers.
24347 J. Dillon. Indicating depth of water in rivers.
24362 R. G. Taitt. Signalling of vessels at piers.
24546 W. L. B. Hall. Lee-rails of ships.
24580 A. Smith. Rowlocks.
24619 F. Cooper. Packings for stuffing-boxes.
24635 E. Reilly and F. W. Fisher. Otter boards.
24636 J Hughes. Composition furnace doors.
24760 C. Ranson. Slide valve.
24766 G. A. Corsen. Mark-knot ropes and cables.
24812 H. H. Lake (G. H. Ward, United States). Feed water filters.
24847 L. and S. S. Younghusband. Lifeboat.
24861 E., T. H., and L. Gardner. Internal combustion engine.
24874 R. H. Woodcock. Propelling boats.
24904 W. Gray. Propellers.
24941 J. W. Hulse. Water-tube boiler parts.
24943 W. S. Hide and A. A. Longsdon. Boilers.
24994 W. T. Sugg. Cowls for use in ventilating.
24999 B. J. B. Mills (E. Jalicard, France). Steam boilers.
25076 H. W. Handcock and A. H. Dykes. Propelling boats.
25114 G. J. Ayling. "Looms" of oars and sculls.
25125 J. J. Hicks and G. H. Zeal. Alarm for indicating a ship's roll.
25164 H. Workman. Water-tube steam boilers.
25178 W. Thomson. Navigational sounding machines.
25185 S. A. de Normanville. Propelling cranks.
25242 J. Imray (La Société Industrielle des Telephones France). Grapples for submarine cables.
25421 W. Proel. Centrifugal governors.
25431 A. B. Anderson. Transporting ships by railway.
25518 J. D. White. Ships and boats.
25530 E. Radziszewski. Steam generators.
25532 W. Hornsby, W. Roberts, and C. James, jun. Valves.
25533 W. Hornsby, and C. James, jun. Turbines.
25548 J. and J. Hopkinson & Co., Limited. Stop valves.
25571 J. K. M. Hessler. Boat propulsion.
25602 C. A. Allison (The International Feed-Water Heater Co., United States). Feed-water heaters.
25620 H. W. J. Wilkinson. Water-tube boilers.
25663 R. Hargreaves. Packings for piston rods.
25695 R. Bridge and G. L. Scott. Friction clutch.
25735 C. S. Dean and C. O. Rano. Cleaning steam generator tubes.
25773 R. Robinson and F. Hall. Pistons.
25788 S. G. Brown. Signalling by cables.
25849 A. J. Boult (J. N. Rundle, United States). Valves.
25854 S. A. H. Noel. Boilers.
25859 R. Griffiths. Lubricators.
25892 J. L. Gordon. Steam generators.

BOARD OF TRADE EXAMINATIONS.

Extra First Class.

October 23rd, 1897.—Colquhoun, .. Ex.1C Paisley
" " " Palmer, B. J. Ex.1C London

NOTE.—1C denotes First Class; 2C, Second Class.

September 18th, 1897.

Budworth, J. A. 1C Liverpool
Campbell, M. H. 1C London
Darch, Ernest . 2C Liverpool
Donaldson, D... 2C Greenock
Ferguson, N. .. 2C "
Fletcher, T. B.. 2C N.Shields
Forbes, J..... 2C Greenock
Gemmell, W. .. 1C "
Grant, J. L..... 2C London
Guildford, J.... 1C N Shields
Hodgson, M.... 1C Dublin
Hodgson, Wm.. 1C Liverpool
Hirst, E. M.... 1C N.Shields
Hunter, J..... 2C "
Hunstone, T. H. 1C "
Hutchinson, J. M 2C Liverpool
McArthur, D. .. 2C Greenock
McClure, D..... 2C "
McIntyre R. .. 1C "
McKinley, D... 2C Greenock
Minchin, W. G. 1C Liverpool
Moffat, Jas. P. 1C "
Mosdale, Jas. E. 2C "
Nugent, J. A. 2C London
Palmer, John .. 1C Liverpool
Plenge, H. T... 1C N.Shields
Richmond, F. J. 2C Liverpool
Rutherford, J... 1C Greenock
Thompson, F.W. 1C London
Thomson, T. .. 2C Liverpool
West, Wm. A.. 2C "
Williamson, J.R. 2C "
Winship, W. H. 1C N.Shields
Woodhouse, A.E. 2C "
Young, H. A. .. 2C London

September 25th, 1897.

Aitken, T. W... 1C Glasgow
Anderson, J.... 2C N.Shields
Barnes, H. W.. 2C "
Barr, J. F. .... 2C Glasgow
Beckwith, Allan 2C Liverpool
Boudry, F. J. .. 2C N.Shields
Bramwell, A. C. 1C Cardiff
Bremner, W. S. 1C Glasgow
Browell, T. .... 2C N.Shields
Brownie, J..... 2C London
Bruce, D..... 1C Glasgow
Buglass, R.W.B. 2C Dundee
Dixon, M. N. .. 2C London
Edward, J. .... 1C Glasgow
Evans, P..... 2C Cardiff
Ferguson, A.... 2C Glasgow
Foyle, J. ..... 2C London
Geddie, W. .... 2C Aberdeen
Grosvenor, A. T. 1C Bristol
Groves, A. T. .. 2C N.Shields
Henderson, A. J. 2C London
Henderson, J... 1C Aberdeen
Hunter, R. J. .. 1C London
Jones, John.... 1C Liverpool
Jones, R. A.... 1C N.Shields
Jones, Robert .. 2C Liverpool
Knox, H. ..... 2C W.H'pool
Laing, J. ..... 1C Glasgow
Legg, P..... 2C N.Shields
Leitch, A..... 1C Glasgow
Macfarlane, J... 1C S'nd'land
Mackintosh, G.D 2C Glasgow
McArthur, J. E. 2C "
McDonald, J. .. 2C N.Shields
McDougall, S... 2C London
McInnes, N.... 2C Glasgow
McIntyre, J.... 1C "
McNaughton, W 2C Dundee
Miller, G..... 1C N.Shields
Rawson, M..... 2C W.H'pool
Richards, H. C. 2C Cardiff
Richards, H. J.. 2C "
Richardson, W.J 2C Aberdeen
Roch, Arthur T. 1C Liverpool
Ross, G. D.... 2C Glasgow
Russell, H. .... 2C "
Scott, James K. 2C Liverpool
Smith, J. V.... 1C W.H'pool
Stonehouse, J.T. 1C "
Taylor, A..... 2C Glasgow
Thomson, R. .. 1C "
Topping, D. B. . 2C "
Warner, D. J... 1C "
Wilson, J..... 2C W.H'pool
Woodland, F.W. 2C Cardiff

October 2nd, 1897.

Bathurst, J..... 1C N.Shields
Bell, John .... 2C Liverpool
Boyes, R..... 2C N.Shields
Burkett, J. E... 1C "
Caisley, W. J... 1C "
Craig, A. ..... 2C London
Hamilton, C. E. 2C "
Harris, H. H... 2C London
Legg, J..... 2C N.Shields
McMillan, R. A. 2C Liverpool
Moffatt, William 1C "
Parker, L..... 2C Hull
Phillip, J..... 1C London
Pressley, F. W. 2C Hull
Richley, H.... 2C N.Shields
Sadler, M..... 2C "
Sivyer, T. J. J.. 2C London
Smith, J. D.... 2C "
Trant, S. Arthur 1C Liverpool
Ward, W. H. .. 2C London

October 9th, 1897.

Abbot, C. F. .. 2C Glasgow
Annal, T..... 1C London
Atkinson, T.... 1C "
Bailey, William 2C Liverpool
Boucher, R. E . 1C "
Cooney, Thomas 2C "
Cromar, G. .... 2C London
Denholm, G. .. 1C Glasgow
Donaldson, A... 1C "
Dunn, W. S.... 1C N.Shields
Dunsmuir, A. .. 2C Glasgow
Ebbett, J. C.... 2C Cardiff
Graddon, J..... 2C "
Greenwood, S.. 1C Glasgow
Hall, W. J. .. 2C Cardiff
Henderson, G... 2C Leith
Home, R..... 2C London
Hornsby, J. A.. 1C N.Shields
Isakson, C. .... 2C London
Johnston, J..... 2C Glasgow
Kluge, T. E..... 1C Cardiff
Luff, B. G. .... 2C "
McCurdy, J..... 1C Glasgow
McKay, Hugh C. 2C Liverpool
Muir, J..... 2C London
Muse, J. G. .... 1C N.Shields
Nairn, M..... 2C Glasgow
Orr, T. R. J.... 1C London
Purdie, T..... 1C Glasgow
Renwick, J..... 1C London
Ritchie, A. .... 2C Glasgow
Short, L. ..... 2C N.Shields
Smith, J. C.... 2C Cardiff
Thomas, John.. 2C Liverpool
Watt, J..... 2C Leith
Wayman, F. W. 1C London
Wilson, R. .... 2C Leith
Wood, F. G.... 1C London

October 16th, 1897.

Anderson, J. S. 2C London
Beadle, H. J. .. 2C N.Shields
Berry, A..... 1C Liverpool
Butt, F. G. R.. 2C London
Clark, R. ..... 2C "
Cockburn, J. W. 1C Liverpool
Coundon, J..... 1C N.Shields
Coutts, James.. 2C Liverpool
Elliott, F. J. .. 2C London
Fullarton, R. .. 2C Greenock
Gardner, J. .... 2C Dublin
Holt, James M. 2C Liverpool
Hutchison, M.. 1C "
Hutchinson, J.. 2C N.Shields
Iredale, T. J. .. 2C Greenock
Jack, A. ..... 1C "
Johnson, J. S... 1C Dundee
Johnson, W. H. 2C Liverpool
Kynman, W. .. 1C Hull
Lafrenais, C. S. 2C N.Shields
MacDonald, H. 2C London
McKay, W..... 1C N.Shields
Miles, E. L .... 2C Greenock
Nelson, J..... 1C London
Ness, R. ..... 2C Dundee
Quinn, J..... 1C Dublin
Roberts, Morris 2C Liverpool

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The Marine Engineer.

LONDON, JANUARY 1, 1898.

THE pushful Japanese, in the outburst of engineering and shipping enterprise following—if not consequent upon—their successful drubbing of the sleepy Celestials, have been scattering their patronage over Western Europe and America, all the orders, however, being accompanied by, if not dependent upon, provisos and conditions which point to a cessation of the flow of patronage just as soon as Japan finds herself in a position to supply her own requirements. Preceding or accompanying the orders, there has been a well organised system of investigation and observation by Japanese emissaries, as to the fitness of firms to overtake the work, and as to how the work is actually accomplished, so minute and elaborate as to place the Japanese—copyists as they are—in a position to dispense with foreign assistance at the earliest moment. Japanese students, during the past half-dozen years or so, have been trained in considerable numbers in the engineering classes at Glasgow University, and since the flow of orders entrusted to British builders set in these students have had practically the free run of the yards where work for their country and Government was proceeding. Linked to the orders too, in most cases, have been provisos with respect to the supply of duplicate plans, working details, &c., which have enabled "the Jap at home" to set about the construction of ships on the latest British principle, and with more than a semblance of the latest British methods. Under the management of a thoroughly trained British shipbuilder work has been proceeding on a steamer of 6,200 tons for the Nippon Yusen Kaisha, on precisely similar lines to those on which steamers have recently been constructed for the same company on the Clyde. This vessel is expected to be ready for launching from the stocks at the shipyard at Nagasaki some time this month. So well satisfied are the Japanese with their present progress that material is now being ordered in this country for a second vessel of the same type and dimensions for the same owners. Two other steamers of between 2,000 and 3,000 tons are also in progress of construction at Nagasaki; and the Japs may therefore be considered already well started on a career of ocean steamship building. Testimony to the extent and direction of the aid which has been and continues to be given—no doubt, in every case, for a suitable consideration—to the enterprising Japanese is found in the interesting fact that all specifications of work ordered by Japan, whether from firms in this country, in America, or on the continent, are drawn up in the English language; an instance of this being the fact that at the Vulcan Works at Stettin, Germany, cruisers are at present being built for Japan from English specifications framed on the lines, and containing, without modification, many of the clauses of the British Admiralty "private and confidental" documents! Some time ago an engineer from Japan—who was trained under Mr. Henry Dyer, of Glasgow, while that gentleman was Principal of the Engineering College at Tokio—paid a visit to this country and purchased machine tools of the highest class for the Nagasaki yard, and at the present time another of Mr. Dyer's old engineering students is here on a similar errand in connection with a shipyard which is being started at Kobe: after Yokohama the most important of Japanese ports. Mr. Dyer, it may also be mentioned, has been deputed to select a naval architect with a British training to take service in Japan under the Government at a salary of not less than seven hundred pounds per annum.

MR. FORTESCUE FLANNERY, M.P., inaugurated his year of office as President of the Institution of Marine Engineers by delivering his presidential address to that Institution on December 3rd, which address, in the form mainly of a retrospect and summary of the progress of Marine Engineering, was of considerable interest. In tracing the evolution of mechanical science in a single century, Mr. Flannery considers that the mind is struck with the marvellous resource of the human mind, and with the vast aggregate mass of ingenuity and patient thought that in three generations had wrought a change so marvellous. One characteristic in the march of progress has been the increase of power developed per unit of weight. From the beam and side—lever engine, to the oscillating cylinder; from the cumbrous slow-moving paddle wheel to the light, swift-running screw propeller; from steam at atmospheric pressure to steam pressure 16 times above the pressure of the atmosphere; from the fire-tube boiler with plates, nearly an inch and a-half thick to the water-tube boiler whose heaviest part is one-sixth of that thickness,—every step has been to reduce the weight of machinery per unit of power. From a consumption of 8 lbs. of coal per unit of power to a consumption of 1¼ lb. of coal per unit of power, every successive stage has been to reduce the weight of the fuel to be carried per unit of power on board ship. Mr. Flannery is struck, in dealing with these reflections with the humiliating truth, that a large amount of now apparently obvious mechanism, simple in action, has been perfected rather by experiment than by invention. Truths

unseen have been stumbled over for generations until forced upon us by the voice of Nature itself. The engineer who designed the engines of the Great Britain, the first steamship which crossed the Atlantic, provided heavy slow-moving engines running at 18 revolutions per minute with an enormous wheel and elaborate tooth gearing to increase the speed of the propeller shaft to 60 revolutions a minute. The whole of this gearing is obviously and simply discarded by the later adoption of smaller and lighter fast-running engines directly driving the propeller shaft. Another characteristic of the progress in marine engineering has been the adoption of labour-saving machinery on board ship. Labour saving is doubly important in marine construction because the weight and space occupied by each individual and the food and water necessary for sustenance, are of so much greater importance afloat than ashore. Labour-saving appliances are now used regularly for loading and discharging cargo, starting, reversing and handling the main engine, and for steering the vessel with its modern ponderous tillers and rudders. With the above rapid progress in marine engineering, the marine engineer himself has advanced mightily with his profession in social status. It is now understood that whilst the marine engineer must be a practical mechanic he may, if he chooses, be a scientist and gentleman as well. As an example of what the practical engineer may do in this age, Mr. Flannery instances the case of the Hon. Robert J. Seddon, a practical mechanic, and also the Premier of New Zealand. Nowhere in a ship is danger in war-time greater, nay, nowhere is it so great, as in the engine-room, with high-pressure steam, and where the men work surrounded by machinery; nowhere will cool courage and perfect discipline be so necessary. To maintain such discipline the dignity and authority of engineering officers must be upheld and established. As accomplished facts in the progress of marine engineering, Mr. Flannery points out that a speed has been attained at sea of 32 knots, or 36·8 statute miles per hour, but attained only in vessels of limited coal endurance; that a speed of 22 knots, equal to 25·34 statute miles per hour, has been attained in vessels of ample coal endurance, and capable of keeping the sea in all weather; that engines and boilers have been manufactured so mechanically perfect that instances are common of continuous steaming for 6,000 miles without stopping or even easing down the engines, from the commencement of the voyage to its finish. It is expected that these results will shortly be considerably excelled in the new vessels to perform the mail contract between Canada and the mother country. Little has yet been done as to any general introduction of other fuel than coal, though petroleum is a fuel at present cheap, and of higher calorific value weight for weight than coal, though it is probable that further progress must be made rather in the direction of increased power from weight of machinery with the old fuel, as in the modern instance of the water-tube boiler, now so generally being adopted in the Royal Navy, thanks to the enterprise of Sir John Durston, a past president of the Institution of Marine Engineers. As liquid fuel is in practice, as shown by commercial companies in South Russia, equal for purposes of evaporation to twice its weight of coal, the establishment of liquid fuel stations in the Far East, for the supply of our Navy there, would probably induce the adoption of grates to burn it. The *Turbinia* is the latest instance of abnormal increase of speed for length, and as most successful developments in large steamers have originated from experience gained in small boats, perhaps the dynamic system of steam engine may have a large future before it.

As is usual, at the commencement of a new year, we publish a return of the tonnage built in the shipyards of Great Britain, and regret to have to point out that in many cases the gross output of those recorded have been spoilt for the latter six months of the year by the Engineers' strike. This has been caused not only by the diminution of labour employed during the last half of the year, but by the absolute losses of orders and contracts from abroad. Many of the firms, whose returns we publish, have notified us of this, but in one or two instances firms whose names may be missed from the list have declined to furnish us with any list, as the returns, under present circumstances, would be misleading. In the case of one firm we are notified that an order for a large passenger steamer for Continental account was offered only, under a contract not containing the usual strike clause, and failing acceptance of this by the British firm, whose inability to do so we can easily realize, the order was placed abroad. On the Tees a large firm reports a loss of quite 20,000 tons below last year's figure, due entirely to the labour troubles of the last five months. At Hartlepool the falling off is quite of equal extent, and on the Tyne, Clyde and Wear the expected output from the promising commencement of the year has entirely been lost in the latter half of the year, due chiefly to the delay in the supply of machinery. The indirect loss thus to operatives, other than engineers, must have been immense in the shipbuilding trade.

A STRAW will show the way the wind is blowing. Marine engineers have been silently preparing themselves for many years for a great increase of recognition

THE LONDON AND NORTH-WESTERN RAILWAY CO'S S.S. "CAMBRIA." (See page 360.)

as regards their importance, both in the commercial Marine and in the Navy. A startling move has been made at last by the United States Naval authorities, who are at last prepared to recognize engineer officers as qualified to act as executive officers. Before long we may see an engineer as Admiral of a fleet. Though some may argue, with justice, that a Jack of all trades is master of none, and that an engineer had better stick to his own department, so long as the importance of that department is properly recognized. Yet it must be sweet to the engineer to see at last that his capabilities for the highest grades of command and executive is likely soon to be recognized afloat as well as on land. If Royal Engineers can make successful Generals, there is no reason why marine engineers, endowed with exceptional capabilities of command and organisation, should not make successful Admirals, particularly over fleets who depend for their very movements and fighting capacities upon the creations of such engineers.

THE LONDON AND NORTH-WESTERN RAILWAY CO.'S S.S. "CAMBRIA."

WE have pleasure in giving a page illustration of the London and North-Western Railway Co.'s new fast twin-screw steamer the *Cambria*, which has been stationed to ply between Holyhead and North Wall. The vessel has been built by Messrs. William Denny & Brothers, of Dumbarton. Her length is 337 ft. 6 in.; breadth, 39 ft.; depth to awning deck, 24 ft. 9 in. She is built of mild steel. In appearance she is very handsome, the long range of casings and deck-houses giving her the appearance of an ocean liner rather than a cross-Channel packet. Except what is reserved for luggage and the parcels post, the passenger accommodation occupies the whole space. The dining-saloon, berths, deck cabin, baths, and lavatories for first-class passengers are of the most luxurious description, the accommodation for ladies being remarkably extensive and comfortable. The advance in the quality of the steerage accommodation more than keeps pace with the recent improvements in third-class railway carriages. The engines, which were designed by Mr. Walter Brock, consist of two sets of triple-expansion engines, supplied with steam at 160 lbs. pressure. Their special feature is a balancing system designed to minimise vibration. The electric light has been installed by the railway company under the direction of Mr. F. W. Webb, of the Crewe Works. The steering is done by means of Brown's telemotor. The ventilation is effected by means of Utley's watertight apparatus, and insures that the fumes of the kitchen and engine-room cannot enter the passenger accommodation. The mean speed recorded in trials on the Clyde was certified at 21·4 knots, the maximum being slightly over 22 knots. The trial trip between Holyhead and Dublin and back took place on Wednesday, December 8th. The steamer left the Holyhead quay at 9.35, passed the breakwater at 9.50, reached the Kish lightship at 12.37, the Bailey lighthouse at 12.53, the Poolbeg lighthouse at 1.6, and North Wall at 1.25—total time, 3 hrs. 50 min.; distance, 64 miles. This run was made against a head wind which amounted nearly all the time to a full gale. For further particulars we would refer our readers to page 237, September number. We are indebted to W. Robertson & Co., photographers, Gourock, N.B., for the photograph.

ACETYLENE LAMPS AND LIGHTING APPLIANCES FOR SHIP AND DOCK PURPOSES.

IN our Mersey Notes last month we made a brief reference to new works which had been opened in Manchester by the Acetylene Gas and Carbide Co., for the manufacture of Kay's patent generators, and other inventions for the production of a safe acetylene gas, and its development and utilisation as an illuminant. The ordinary method of manufacturing acetylene gas is so well known that no detailed description is necessary, except to note that the process as patented by Mr. Kay has been specially designed with a view to simplicity in the arrangement of the apparatus, and perfect safety in the production of the gas. Various types of generators are being manufactured by the company, suitable for either small lighting installations for dwelling-houses, larger sizes for works purposes, or for public buildings, and others of a portable form. It is this latter type of generator—of which we give an illustration—that will mainly interest our readers, as it has been designed specially for use in vessels discharging or loading cargo, quay lighting, &c. The apparatus, being portable, can be placed in any convenient position, either on the deck of the ship discharging, or on the quay, and is fitted with upright standard, curved bracket, and gas arc lamp for lighting the quay or deck. This arrangement is also found specially serviceable when loading from or discharging into lighters alongside, as by placing the generator and lamp in a convenient position, a brilliant light is directed on to the loading operations alongside, while the deck operations can be carried on with facility. Each lamp, although nominally of 150 candle-power, will effectively illumine a circle 40 to 50 yards in diameter. The generator is placed on the deck or quay as convenient, and in addition to supplying the standard lamp, two additional lamps of 150 candle-power each can, if required, be connected to, and supplied from the same generator at the same time, by means of two special connections, branched off the upright pipe to the lamp near the top of the generator, with separate stop-cocks, interchangeable couplings, and 60 ft. lengths of special flexible tubing to each lamp. This arrangement enables the lamp to be fixed up in any convenient position in the holds of vessels loading or discharging.

The usual method of application is to place the generator about amidship, and run a hose from the generator to the forward and after holds. The lamp may then be suspended by the flexible tubing at any desired height, or instantly raised or lowered as required. Each lamp gives a brilliant light of over

150 candle-power, and one lamp is sufficient to illumine the largest hold, replacing twenty-four of the ordinary oil cargo lamps. The quantity of gas consumed is less than 2 cubic feet per hour, and the orifice supplying the gas is only $\frac{1}{16}$ in. diameter, while the gas pressure never exceeds 2 in. of water, or $1\frac{1}{2}$ oz. per square inch. The lights are extremely small, and enclosed in windproof cases, which cannot be opened when fitted with the company's locking arrangement, except by the attendant in charge, whilst the supply is completely controlled by the cut-off stop-cocks on the generator. The safety and complete immunity from fire risk furnished by this system will be more fully appreciated the better the details and working are understood. As a matter of fact the damaging or accidental upsetting of the generator would only result in the spilling of water, and the extinguishing of the light. The generators are made in various sizes, and are very compact considering the great amount of work done. A generator 18 in. diameter, by 24 in. high, will supply two lamps of 150 candle-power each for eight hours, without requiring attention or re-charging. The last-named operation can, however, be performed in one minute while the lights are burning, by simply withdrawing a basket containing the exhausted charge, and inserting a fresh charge; on screwing up the door the operation goes on as before.

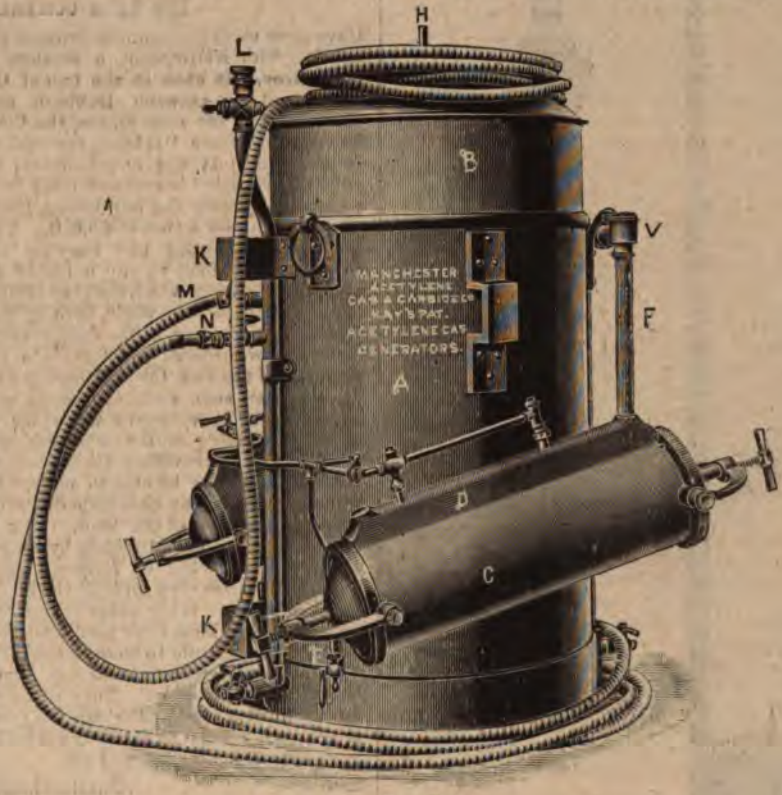


Fig. 1.

This complete portable plant consists, as shown in Fig. 1—without, however, the lamp standard—of three main parts:—(1) The water tank A, constructed of heavy steel plates, rivetted and galvanised; (2) The gas-holder B, also of rivetted plates, galvanised, moving vertically on guide wheels; (3) The generating cylinders C, which are of cast-iron, and fixed to the water tank A, by means of a flange plate and washer, bolted to the tank. The generating cylinders are fixed to the tank in a sloping or inclined position, at a particular angle, all the doors and joints being accurately turned to a bearing and scraped tight. The condenser D, which is placed over the generator at a similar angle, receives the gas after it is generated, and permits any water that may pass into the condenser with the gas to gravitate back to the lower end, whence it returns to the generating cylinder. The gas as generated is conveyed upwards by a pipe E, to a specially designed gas valve V, so designed as to lift with one-tenth inch pressure, which also prevents the back flow of gas into the cylinder when recharging it. The gas passing through the valve V, is conveyed downwards to the lower part of the water-tank and upwards within it, through the water to the gas-holder by a vertical pipe, any moisture passing over being removed at the drip well W. The water for generating the gas from the carbide is supplied from the tank A, through an automatic governing valve F placed inside, to the generator, to which it is admitted at the top from the condenser through an injector in a fine stream or spray on the carbide. This water-valve F is controlled by a floating disc G, fitted to slide on guides up and down on the two vertical inlet and outlet gas pipes inside the tank A, and is connected to the end of the weighted valve lever by a chain. When the holder is at its lowest position the spindle H, to which is fitted a rod and disc G, H, presses on the floating disc G, and slackening the chain relieves the valve lever F, from the lifting action of G, and allows the

lever to fall downwards to open the valve F, and water to flow in upon the carbide in the generator C. Two fluid ounces of water are admitted to the generator by the automatic governing valve F, generating ⅛ cubic feet of acetylene gas, this immediately passing into the gas-holder B, which rises, carrying with it the spindle and disc above the floating disc G, which relieves the lever of the governing valve from the

Fig. 2.

lifting action of G, and the valve closes until the quantity of gas is consumed. The lights being turned on, the automatic governing valve F adjusts itself to the quantity of gas being consumed, supplying a proportionate quantity of water whether one or ten lights are taken from the generator. The cycle of operations continues until the charge is exhausted. A lamp standard, shown in illustration, Fig. 2, fits into the bracket K, and is readily removable. When placed in position the lamp supply pipe is coupled to the generator at the stop-cock couplings. The flexible tube pipes M and N are shown attached ready for connection to the lamps.

Kay's patent fixed plants for acetylene gas, as already stated, are made in all sizes for private houses, public works, and for the lighting of small towns or districts, the general principle being the same, except that all the automatic gear is placed outside and is easily accessible, whilst the condensing and purifying arrangements in the large plants are, as might be expected, more elaborate and complete than is required for small portable apparatus.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Tyne Commissioners

Have once more had trouble through the obstruction of a sunken wreck. The *Kottingham*, a steamer of some twelve hundred tons gross, was sunk at the end of October by collision in the Tyne, and lay between Hebburn and Wallsend. She was abandoned by her owners, and the Commissioners advertised in November for the "raising, removal, and beaching at Walker" of the wreck. It was not, however, till November 25th that a reliable and suitable contract could be made. Then they agreed provisionally with the well-known East Coast Salvage Company to do the job for a sum of £5,000. That amount was to include the cost of lighting and buoying the obstruction, and the company undertook to pay a fine of £10 for every day beyond nine weeks during which the obstruction should continue. Great complaints have been made, both by the riverside owners and by steamship managers, of the danger caused by the wreck, and the Tyne Commissioners are fortunate in getting a firm of the standing of the East Coast Company to undertake to get rid of it for them on such stringent terms as to time. The committee agreed to the provisional contract for raising the wreck at their monthly meeting on December 9th, and determined to consider the question of providing themselves with appliances, so that in future they might be able to undertake work of this character themselves. It may be a little doubtful whether they will benefit much by provision of this kind. For though accidents within their waters are unfortunately by no means unprecedented, they are far from being of frequent occurrence. They cannot, therefore (unless they go into the business for others, as well as for themselves, a thing which is practically impossible and highly undesirable) to keep their plant fully occupied. It will thus not be worth their while to have as complete an installation as those of professional salvors, and big jobs will therefore tax their energies too severely. They will still have to seek outside aid for such heavy work. Perhaps the possession of a few appliances might be beneficial to Harbour authorities, but they cannot hope to do everything for themselves.

Publications.

Messrs. Elder, Dempster & Co., of African House, Liverpool, the agents of the well-known lines which have the practical monopoly of the passenger trade to the West Coast of Africa, have published a little volume entitled "The Land of Sunshine for Health and Pleasure." It deals with the Canary Islands, where all their passenger steamers call both outward and homewards. Messrs. Elder, Dempster & Co. have brought the Canary Islands to our very doors. For not only is the time of passage greatly reduced, but the number of opportunities for passage have been so very vastly increased that a flying visit can be paid to them in little more than a fortnight. The firm has not contented itself with providing steamers to take intending passengers thither. It has even built hotel accommodation in favourite localities for the convenience of the traveller. This little book gives a short account of the islands, of their wonderfully mild and equable climate, and of the sights to be seen there. It is very fully illustrated with a number of plates illustrating, amongst other places, Las Palmas, the Hotel Metropole, and the lovely valley of Teror. It may be added that access to all the islands of the group is now not only possible but easy, as there is a regular inter-island service of steamers, also under the management of the firm.

The White Star Company send me their annual almanac in its little morocco case with the twelve cards, one for each month of the year. The cards this year bear etchings which are of even greater interest than usual, for many of them are devoted to scenes connected with the visits of the *Teutonic* to the review at Spithead, and they show, by the indisputable evidence of the sun, how valuable an auxiliary she would prove to the Navy in time of war. Then, too, there is shown the progress of the new *Oceanic* already well in frame in Messrs. Harland & Wolff's yard at Belfast. Altogether the production is worthy of the artistic reputation of the line. Inside the case is given the usual fleet list. There are no removals, and the *Cymric* appears for the first time, so that altogether we find the fleet standing at:—

Five Atlantic Mail steamers of	33,905	tons	gross
Seven Atlantic cargo boats	,, 52,712	,,	
Three New Zealand liners	,, 20,741	,,	
Four Pacific liners	,, 17,442	,,	
And three tenders	,, 1,168	,,	

making a total tonnage of 125,968 tons of steamships.

Next year it will be seen, probably, that considerable changes have taken place in the constitution of this fleet. The 17,000 odd tons of the new *Oceanic*, at all events, will have been added for one thing.

Dock Questions.

The various harbour authorities still seem to feel that the increasing size of ships make new schemes of improvement imperative upon them. It is reported that a London syndicate has bought the Passage and Queenstown Docks from Sir John Arnot, and it is stated that the purchasers will make considerable developments in their new acquisitions, and in some sort try to make the Southern port hold a similar position for building and repairs to that held by Belfast. Plymouth is going to follow Liverpool and Southampton, and provide train-to-boat facilities. It recognises in its scheme that a draft of water in modern vessels of not less than 30 ft. must be reckoned with, and it is seeking Parliamentary powers to spend a sum of half a million on improvements under the direction of Sir Wolfe Barry. Captain Hatfield, the well-known and shrewd, though eccentric, shipowner of Liverpool, has been somewhat severely criticising the scheme of the Dock Board, and suggests that, instead of spending their money in taking out and replacing the central docks they should break fresh ground by building the new docks in Dingle Bay, which already belongs to the Board, although it has not as yet been made use of by its owners. The docks there built would, he says, be in close proximity to railway facilities, and would be no further from the heart of the city than many of the best patronised berths. Moreover, he argues that the placing of a dock wall at the front of the bay would tend to make the tidal stream run more directly down to Liverpool Bay and the Irish Sea, and would, in conjunction with a training wall at Tranmere, make the Pluckington bank a thing of the past. Thus, he concludes, the dreaded obstruction could be dispersed by natural means. There are, however, great dangers in tampering with the banks of such a river as the Mersey. An accumulation, driven from one site, is apt to take up a fresh position in another and perhaps even more inconvenient place. I should therefore imagine that the skilled advisers of the Dock Board would be exceedingly likely not to risk following the advice of their critic.

The Cape Service.

The new Union Liner *Briton* has begun her active service in the Cape trade. In his speech at her send-off the chairman of the company referred to her not as "the biggest vessel which had ever sailed to a British colony" (the phrase I criticised last month) but as "the biggest British steamer which ever crossed the line." That I think she is. Her advent has enabled the company, in spite of the fact that the *Arab* is engaged in an extra service with cargo only, and that the *Spartan* is making a round of trooping, to dispense with another of their older vessels. And so the *Athenian*, which arrived from the Cape in December, is announced as sold out of the service. She is a vessel of 3,882 tons gross register, and was built in 1881 at Glasgow by Messrs. Aitken & Mansel. She is thus but 16 years old. She now has triple-expansion engines, and yet she is already out of date in the Cape trade, and goes to a syndicate who intend employing her in the conveyance of miners and others to the Klondike goldfields in the spring.

Klondike.

indeed, seems to have a voracious capacity for old steamers. Some little time ago I mentioned a report that the old American liner *Chester* was to go thither. This report seems to be unfounded. It is now stated that the company's Cramp-built liners *Pennsylvania*, *Indiana* and *Illinois*, vessels of about the same tonnage and age as the *Chester*, are to leave the Antwerp-New York branch of the company's service (where they have been employed since they were taken out of the line from Liverpool to New York) and to go to the goldfields. Their place in the Antwerp service is to be filled by the bringing into use again of the *Chester* and *Berlin*. This, however, seems to be largely guesswork. There are, moreover, reports that two other ancient Atlantic liners, belonging to an old, established Liverpool Mail line, are sold for the Klondike rush-and that Messrs. Singlehurst & Co., of Liverpool, have also disposed of one of their older boats for the same trade.

The Castle Line,

recognising the importance of the East African developments, have opened a new service to Beira direct without transhipment. The first sailing thither was made at the end of November by their cargo vessel the *Lismore Castle*, and she is followed a month later by the new and large steamer *Dunolly Castle*, specially built for the carriage of machinery and heavy goods at the end of last year by Messrs. Barclay, Curle & Co.

The Orient Company

has just renewed its contract with its two firms of managers for another period of ten years. Great satisfaction with the way in which their business has been conducted seems to have been displayed by the assembled shareholders. It may be interesting to mention what the general terms of the agreement are. The managers provide offices, clerical staff, and suchlike, and, for their services, receive a percentage on the gross turnover. This percentage rises to 5 per cent. when the dividend amounts to a return of 5 per cent. on the share capital. When it falls below that return the managers' percentage is only 4 per cent. on the gross earnings. At this meeting it was announced that the improved *Ophir*—whose name, by the way, has not yet been announced—will, it is hoped, be at work by the close of 1898. The old *Garonne*, built some quarter of a century ago for the Pacific Steam Navigation Company by Robert Napier & Co., and bought by the Orient Company when it commenced its service, has now been parted with. Thus the *Lusitania*, of about the same age, is the only vessel left in the fleet for the public yachting department of the business, and she is at the moment engaged in the Mail service, relieving the *Orient*, which is undergoing a complete overhaul. From this and other facts which have recently transpired, one rather leans to the opinion that the public yachting business is not quite the inexhaustible gold-mine which those who went in for it so strongly a few years ago at first fondly imagined. This is hardly to be wondered at when one remembers that the whole charges of the adventure have to be met by passage-money, and that the rate of fares is governed by the scale which prevails in regular liners, who have not only passage-money, but also freight and mail receipts to swell the gross earnings.

The Cunard Line.

Two very gallant rescues by Cunarders were commemorated at the Liverpool Town Hall on the 16th December. The first was by the Boston liner *Catalonia*, Captain Stephens, which, when homeward bound, picked up the crew of fishing vessel *Vague*, of St. Malo. This took place when the vessel was in a sinking state on the banks of Newfoundland at 1.30 a.m., on the 20th October. The other was the taking off of the crew of the s.s. *Millfield*, of Whitby, bound from Baltimore to Belfast, by the *Etruria*, Captain John Ferguson, from New York. The *Millfield* had encountered very severe weather and had lost her funnel and most of her deck-fittings, including the engine-room skylight. Very large quantities of water had found their way into her machinery department. She was quite unmanageable and about to founder when the *Etruria* sighted her at half-past two on the 10th December in the present year. The vessel was about 140 miles west of the Fastnet. The weather was so bad that the *Etruria* lay-to for improvement, and it was not till three o'clock on the Saturday morning that the rescue could be effected. The services rendered by the *Catalonia* to the *Vague* seem to have been undertaken under equally trying circumstances. The presentation included the masters of the respective steamers,

who, though they do not, of course, leave their posts on the bridge, have a great responsibility on such occasions and also contribute very much to the success of the operations by the way in which they handle their vessels, and protect as far as may be the boats they send away. In the case of the *Etruria* the boat was manned by two officers and seven men, and it is interesting to note that this dangerous work did not deter volunteers, as the whole ship's crew were anxious to take seats in the lifeboat, and the difficulty seems to have been to prevent too many going away in her.

The Loss of the "Aden"

seems likely to raise some curious questions as to the rights and liabilities of underwriters of cargo. A couple of Aden firms contracted to salve the cargo of the unfortunate ship, and accordingly proceeded to the Island of Socotra with an expedition. A number of men with boats and other appliances were taken by a steamer to the wreck, and then left there to get together a cargo for her to convey to Aden. In the absence of the vessel, however, a large force of Somalis appeared on the scene and took possession of all that had been landed, and of the wreck as well. Signals were made by the defeated sailors to a passing steamer, but the captain would not interfere. His idea on the subject of non-intervention were shared by the captain of the salvage steamer when he came back, and he merely took off the steam pinnance and the men, and left the Somalis in undisputed possession of ship, salved cargo, and boats. It is said that there is a convention between our Government and these natives that they are welcome to all the property that comes ashore in consideration of their abstaining from injuring shipwrecked people. It would be interesting to know whether, if the *Aden* had not been a British ship, the same rule would have applied. One would like to know, too, if the Somalis recognize the differences and distinctions between the various nations of Franks, or if England made this extraordinary bargain as well on behalf of all maritime nations as on her own. What, may we ask, do the underwriters—who are said to be interested to the extent of some £18,000 in the property handed over in this wreck—think of the sacrifice of their property for the sake of some possible benefit to some problematic shipwrecked seafarers at some future date?

The Nederland American Steamship Company

has been so satisfied with the big twin-screw cargo and passenger vessel it recently had from Belfast that it has ordered a couple more of the same kind but somewhat larger and faster. The first of these two is already well in hand. The other, just ordered, will be a big ship and have very good speed. The contract is for no less than 17 knots. She will carry two hundred saloon passengers, and will obviously do much to increase the passenger trade of her owners.

The Roller Boat.

The *Shipping Gazette* contains an advertisement offering for sale the new "rouleur" steamer *Ernest Bazin*. It appears that this craft, about which it is said that Sir Edward Reed has "again reported most favourably," was built at St. Denis by the Societe Cail. She is now lying at Havre. The platform, which corresponds, of course, with the hull in ordinary vessels, is 126½ ft. long and 40 ft. beam. There are six rouleurs and a screw for propelling the craft. The sale is attributed to the fact that the owners are about to construct a larger vessel on the same plan. Readers will probably remember the opinion which Sir Edward Reed gave in reference to her. He seemed to say that of all roller ships (of which the name seems to be legion), she is, to his view, the best in design. I did not, however, gather from his report that roller ships are ever likely to supersede vessels built on the old plan for commercial and cargo-carrying purposes. In this connection it may be mentioned that an advertisement offering for sale the Winans' cigar ships has appeared in the same columns. The death of their owner has brought these curious ships into the market, and Southampton water will lose what have been very prominent objects in the port for almost a generation. They were built about the year 1863, and were said to have run down very much. At all events, the price fetched at auction for the two was just £400, and it was stated that they were purchased for breaking up. As one of them was no less than 256 ft. in length, the purchaser must have got a good deal of old metal for his money.

The Great Gale

at the close of November setted the fate of the old *Foudroyant*. She went to pieces very rapidly under the the stress of so exceptional a storm and the beach at Blackpool was strewn with her timbers. The historical associations (and the copper bolts with which she had been fastened) proved a very great temptation to the inhabitants. Some injury was caused to the pier by the mass of debris driven against it. But another gale from the opposite quarter soon sprang up and relieved the strain in a way that tugs had failed to do. So the old ship is gone and her fate in falling to the elements is better than being spared for a season to minister to the curiosity of trippers and to the smartness of quack medicine vendors.

Forty Year Old Whiskey

might be the heading of an announcement from an American correspondent who details the salvage of the cargo of the wreck of the *Arabia*, a vessel lost on the Missouri River as long ago as the year 1848. The cargo consisted largely of the popular spirit, and it is said to have been got up none the worse for its 40 years' sojourn under water. If it be true that it is none the worse, it must follow that it is very much the better, and there can be no doubt that the haul was a very valuable one. In 1848 our intelligence from the United States was by no means so full as it is to-day, and I do not think that the fact that I can find no contemporary account of the shipwreck is any real reason for doubting that the story is a genuine one.

The P. & O. Company's Steamers

have had their misfortunes in various parts of their extensive beat. Fortunately there is no loss of life to record. The first incident to be recorded ought really to have been included in last month's Notes. A correspondent of the *Times*, under the heading, "A P. & O. Steamer in a Typhoon," gave a graphic account of the experience of the old liner, *Kaisar-I-Hind* (elsewhere mentioned as sold out of the fleet) in a typhoon off the Paracels on September 14th. The character of the weather she encountered may be gathered from the fact that she only made 39 miles in twenty-four hours, and that she lost all her boats and her bridge. Some of the funnel stays being carried away, the funnel itself nearly followed suit, and the saloon, staterooms and smoke-room were damaged and flooded. At this juncture a spanner, weighing about three hundred weight, broke loose, and went down the engine-room skylight, where it wrecked two sets of gratings and brought itself up, with the debris it made, just over the main steam-pipe. From this precarious position it was rescued by the gallantry of the engine-room staff. What would have happened to the boatless passengers and crew if the steam-pipe had been cut is not pleasant to contemplate, and it is not an exaggeration to suggest that all on board owed their lives to the pluck of the engineers, who averted total disablement of the vessel at the risk of their lives. Securing a heavy weight of this kind, in a tumbling ship, is at all times dangerous work. When the additional risk of being scalded to death is added, the credit due to these intrepid men is further increased, and we may feel very proud of this, the latest recorded achievement of marine engineers. Then the company's steamship *Clyde*, bound from Marseilles to Malta at the beginning of December, caused some considerable anxiety and alarm by a very protracted passage. It appears that on the afternoon of the 4th, whilst still in the Gulf of Lyons, she encountered a mistral, which, by the morning of the 4th, had increased to a hurricane. At daybreak the vessel fell off into the trough of the sea, owing to the breakdown of the steering gear, which had previously shewn signs of failure. There seems to have been something very like a panic amongst the passengers, who made up their minds that the destruction of the vessel, and of all on board, was imminent. She, however, reached Malta safely on the morning of the 9th, having suffered nothing worse than the wreckage of a cabin, and the loss of one boat and some canvas. A mysterious source of damage seems to have been, according to the Malta correspondent of the *Daily News*, a large gun, which broke loose and took charge of the deck. What the gun was doing on board, whether it was for signalling or for offence, or as deck cargo, does not appear. The whole incident seems to have caused some excitement in the overdue market at Lloyd's, and gave the passengers generally an opportunity of presenting an address to the captain (which he, no doubt, well deserved), whilst it elicited from an M.P. passenger the usual letter to the *Times*. This epistle is really an instructive document, and, coming as it does from a representative in Parliament of the new inland Lancashire port, throws a strong light on the nautical

knowledge of those who found the means for the construction of the Manchester Ship Canal. It is a pity to attempt extracts from this letter, for, as a whole, it is a gem. But I must just mention its reference to the mysterious gun, of which I have already spoken. "It rolled backwards and forwards on the upper deck, dragging a chain after it"—as though it were a sea-sick watch dog. The unfortunate passengers "learnt some of the perils of the deep. No land, no light, no ship, no help was in sight." And the waves were, in the orthodox fashion, "mountains high." Though Mr. Lees Knowles bewails the fact that the *Clyde* was out of sight of land at this juncture, we may imagine that Captain Gordon and his officers, in charge of a helpless vessel in a heavy sea, were of a very different opinion, and profoundly thankful that they had plenty of sea-room.

It is announced that the relatives of the missing passengers of the *Aden* are about to send another expedition to search the Arabian Coast. It seems a little surprising that all this seeking for traces of the steamer's missing boat and her ill-fated occupants shoud be—so far as one can gather—undertaken at the charges of their friends. Hope may be dead in the minds of those connected with the vessel herself, and they may feel that search is useless. But surely it would be a gracious act for the company to undertake to satisfy the friends of those who were lost, that everything has been done to find their relatives. Money cannot compensate for the loss of friends, but it is hard, indeed, if this search should be an additional monetary burden on the bereaved.

The changes in the P. & O. Fleet of the year have been:—*Mirzapore*, built at Greenock by Messrs. Caird & Co. in 1871, sold out of the service; *Kaisar-i-Hind*, built seven years later in the same yard, also sold; and *Aden*, built in 1891 at Middlesbrough by Sir Raylton Dixon & Co., lost. This means a total removal of about 12,000 tons of shipping. The *India* and the *China* joined the fleet at the close of last year, so that only the *Arabia* and *Egypt* have been added during the current twelvemonths. But as they total up to about 16,000 tons gross, the fleet altogether contains about 4,000 tons more than it did a year ago.

The London and North Western Railway

have got their new steamship at work. They themselves supply particulars of her trials, and they should therefore be accurate as far as they go. The vessel is built and engined by Messrs. Denny, of Dumbarton, who guaranteed a speed of 21 knots on a run of a hundred miles, burning the Welsh coal ordinarily used by L. & N.W.R. steamers. The course chosen was between Cumbrae and Corsewall, and at the first trial on the 19th November the guarantee was exceeded by three-tenths of a knot. The following week a further trial took place under similar conditions, and an improvement of another tenth of a knot was shown. No details as to draft, air pressure, I.H.P., or coal consumption are published.

From other sources, however, I learn that the vessel, which is of 1,872 tons gross register, is 337 ft. long, 39 ft. beam, and 24 ft. 9 in. deep to her awning deck. Her mean draught is under 12 ft. She is propelled by two sets of four-cylinder triple-expansion engines balanced on the "Yarrow-Schlick-Tweedie" system. In each set of engines there are h.p. cinlinder 26 in. diam., i.p. cylinder 40 in. diam., and two l.p. cylinders 43 in. diam. Steam is supplied by eight single-ended steel boilers, having in all 24 furnaces. These boilers are in two stokeholds, and are adapted for use with forced draught on the closed stokehold system. The working pressure is 160 lbs. The usual installation of feed-heaters and evaporators is fitted, and a patent of Mr. Denny, and of Mr. Brace, the well-known naval architect of Liverpool, is employed to prevent the expulsion of cinders from the smokestack tops when running under forced draught.

The Channel Islands Service.

Not content with all the advantages of a short sea route and fine steamers in their Channel Island service, the Great Western Railway is about to grant another facility to the passengers who travel by its route to the Channel Islands. The announcement is made that an entirely new harbour with a water space of about 70 acres is to be constructed near the Admiralty Breakwater at Portland, in place of the present Weymouth Harbour. The new harbour will be on the Portland side of the Nothe, and will be given excellent accommodation for the prompt receipt and despatch of trains alongside the steamers.

A Board of Trade Inquiry

has been held into the loss of the *Grimsby*, an old Cardiff steamer, which was abandoned in Barnstaple Bay in August. The vessel was bound from Cardiff to St. Malo with a cargo of coal. Her history is a long, and of recent years, a highly unsatisfactory one. The evidence showed that her value was £1,500, and yet she was insured for £2,000. Thus she was, in the opinion of the Court, over-insured. At the same time she was considered unseaworthy. One point against her was that she had been bunkered with worthless coal. This coal had been previously the subject of complaint. It was supplied to her by a director of the company that owned her. The worthlessness of the coal seems to have contributed to her loss when she sprang a leak. That leak, however, might not have been fatal to her if such measures as the Court deemed prudent had been taken by the master. The result of the whole inquiry is that the master has his certificate suspended for two years, whilst the manager and the coal-dealing director are each condemned to pay two hundred guineas towards the cost of the inquiry.

The Compagnie Generale Transatlantique.

In the August issue of these Notes I referred to the intention of this great French Mail Line to build four fine express steamers in a period extending over ten years. The plan has now been considerably modified. The original number of vessels is to be adhered to, but the rate of output is to be very greatly accelerated. The programme will be completed in six years instead of in ten, and two of the vessels are to be at work in the spring of 1900, so as to be ready to take their share in the traffic attracted by the Great Paris Exhibition to be held in that year. The speed of the new steamers (which are to be fitted, of course, with twin screws) will be about 22 knots on trial. Their dimensions will approximate very closely with those of the Cunarders *Lucania* and *Campania*. One of them is to be called after one of the Rhine Provinces and the other will commemorate the great Eastern ally of the Republic.

It is a wearisome recital, perhaps, month after month to give instances of the advantages of twin screws. Yet while Mail Lines refuse this guarantee of security to Her Majesty's Mails and Her Majesty's lieges it is necessary to be constantly showing how great an advantage duplication is. The Compagnie Generale's steamer *La Touraine* left New York on the 4th December for Havre. When three days out (and thus less than half-way across) one of her tail shafts broke and the port propeller fell off. Had she been a single screw here would have been a pretty predicament, and an immense salvage award if anyone big enough to take charge of her had been lucky enough to come along. But having duplicated machinery she simply went on with her voyage, though, of course, at considerably reduced speed. There was no anxiety, no putting back, no great delay. She made a passage of 10 days and a half instead of one of seven as usual, and that was all. She earned her passage-money and freight in due course, and brought herself to the port where repairs will be most expeditiously and conveniently effected.

The Tapscott Case.

This unfortunate matter reached a termination in the Crown Court at the last Liverpool Assizes, when Mr. W. W. Tapscott was sentenced to three years' penal servitude for the misappropriation of the funds of four of the single-ship companies whose affairs he managed. It was said that the defalcations amounted in the aggregate to something like £36,000. Not only was Mr. Tapscott sole partner in the firm which acted as managing owner of these vessels, but he was also sole director of the company which owned them. The shareholders were thus almost powerless in his hands. The only possible check they could have on the affairs of the companies was by examination of the companies' books. The transfer and re-transfer of money from the account of one company to that of another, and even to other accounts, practically deprived shareholders even of this small check. It would be well if those who are tempted to invest in such enterprises would study the story of this case, and not throw themselves and their money too blindly into the hands of persons, however respectable they may appear.

Forty Knots an Hour.—There is to be constructed at Newcastle-on-Tyne by the Hon. C. A. Parsons, the inventor of the system of marine propulsion by steam turbines, a vessel of the torpedo boat destroyer type, which he estimates will be capable of travelling from 36 to 40 knots an hour.

ENGLISH'S COURSE AND POSITION-FINDER.

AN extremely simple but ingenious instrument has been devised by Lieut.-Colonel English to carry out a ready method, available by night or day, of finding a ship's course and position on a chart, from observations of the angles between her course and each of two known fixed objects which are within sight at the time.

In the adjoining diagrams we illustrate this instrument which is being manufactured and sold by the well-known firm of instrument makers, Messrs. Heath & Co., Limited, of London and Crayford, S.E., and also diagrammatic views showing the method of using the instrument upon the chart under two different conditions.

It will be seen from the diagrams that when the before-mentioned two angles are determined, a simple geometrical construction will show that all the possible courses, on which the ship can be, will converge to a point situated on a circle of such a diameter that its circumference will pass through the two fixed objects and the position of the ship.

This result may be immediately laid down on the chart by the use of this instrument, which consists of a revolving ring, fitted with sight vanes diametrically disposed and carrying two parallel wires coincident with the same diameter, adapted to act as guides to a pencil, by which marks can be made on this circumference of either of two semi-circular protractors. These protractors are placed concentrically with the revolving ring, as shown in Fig. 1, so that their straight edges are parallel to the line of the keel.

After the objects have been sighted in succession, and the angles between their directions and the line of the keel registered by pencil marks made on the protractors, using the parallel wires as guides, the protractors can be removed from the instrument and placed upon the chart.

Two pins furnished with clips for holding the protractors steady are fixed on the chart at the positions of the well-known objects, and the line joining these positions is prolonged both ways in pencil.

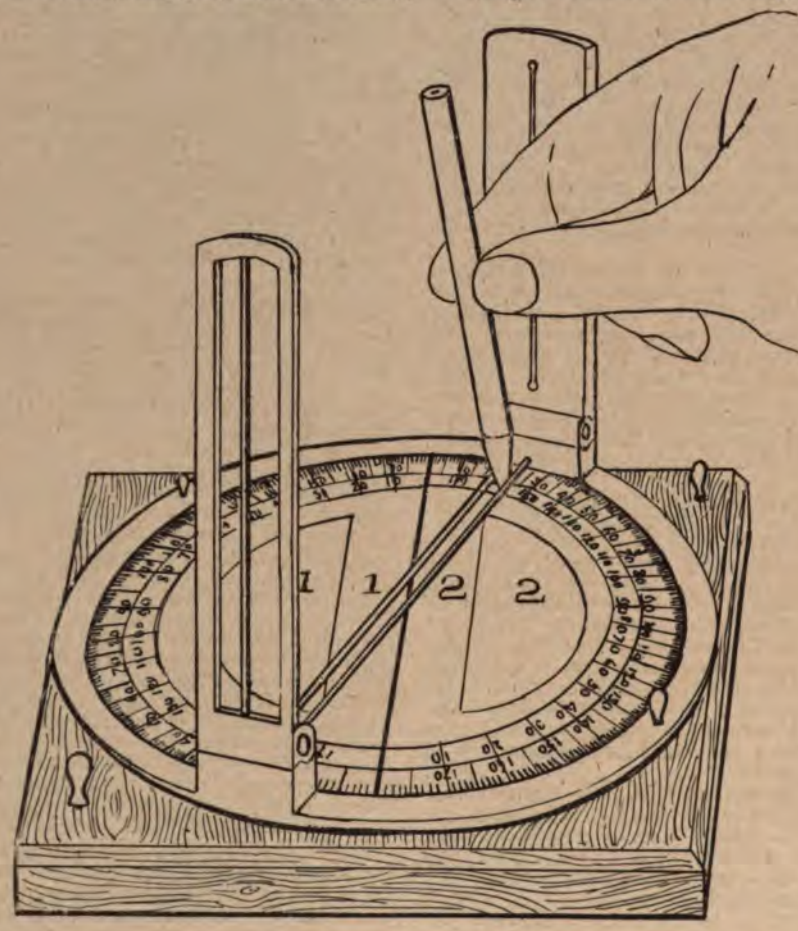


FIG. 1.

The centre of each protractor is held at the pin which represents the object, the direction of which is registered upon the other protractor; this is shown in Figs. 2 and 3, from which it will be seen that protractor 1 is placed on station 2, and protractor 2 on station 1. The protractors are then turned round the pins as centres, until the pencil marks on their circumference coincide with the line passing through the said object of observation; or if, as is shown in Figs. 2 and 3, leeway or across current has to be allowed for, instead of prolonging the line on the chart joining the positions of the two well-known objects, lines should be drawn from each object in the same direction

relatively to the line joining the two, as that in which the estimated actual course is relatively to the line of the keel, and the protractors should be placed so that the pencil marks on their circumference coincide with these lines.

When this is the case, the straight edge of each

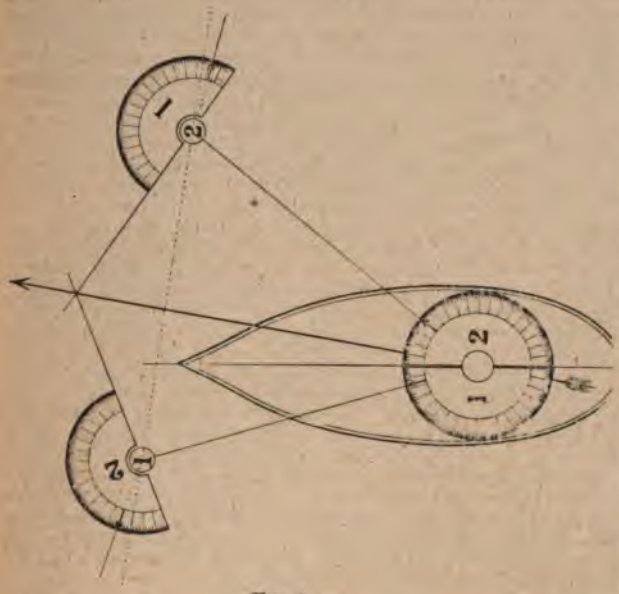


Fig. 2.

protractor will be directed toward the point to which all the possible courses converge, and the intersection of these directions will fix it.

This will, in many cases, without proceeding further, afford the information necessary for steering a safe

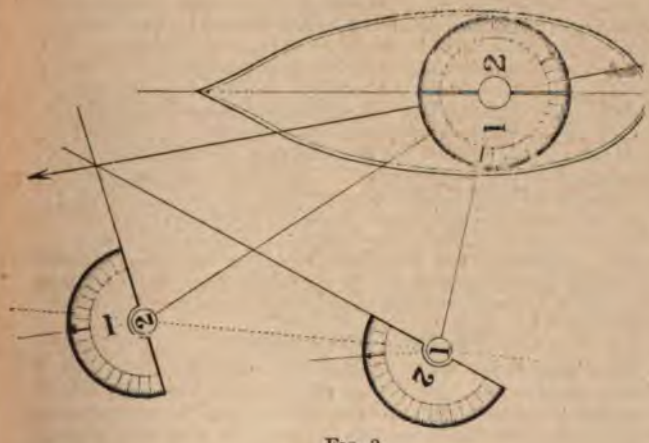


Fig. 3.

course but if it is desired to find the actual position of the ship, the corrected compass course, if known, may be drawn through the point found; or if from any cause the compass course is uncertain, the observations may be repeated after an interval, using either the same or any two suitable objects, to find another point in the course, which can then be drawn through the two points.

Either protractor may then be laid on the chart, with its straight edge parallel to the line of the keel, and its centre at the position of the object corresponding to the pencil mark on it, when the prolongation of the line joining the centre of the protractor with the pencil mark will intersect the course at the position of the ship.

Figs. 2 and 3 illustrate the geometrical construction involved in the two cases, of the course lying between the known objects, or on the same side of both respectively.

The pins and protractors are numbered in order to prevent mistakes in fixing them in position on the chart. It must be noted that the protractors are shown in the diagrams, both in the position which they occupy whilst the observations are being taken, and also as applied to the pins on the chart. The small arrows on the protractors denote the pencil marks.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

Warrant Rank for Engine-Room Artificers.

THE important change in the constitution of the engine-room complements of men-of-war, which has long been pending, is now to be made almost immediately. It will be remembered that Mr. Goschen stated in his memorandum this year that it was intended to create a new rank of warrant officer engineer, and the regulations on the subject have now been issued. The list of candidates closed on Christmas Day and the examination takes place on the 3rd of this month. Originally it was intended that the class should be confined to about a dozen engineer artificers for duty in flagships only, but it has now been decided that the initial strength is to be fifty, which number will be gradually increased to two hundred. The men of the new rank will be distributed throughout the service, and will undertake duties at present performed by assistant engineers. They will also take charge of the machinery of small vessels. The names of fifty suitable candidates for warrant rank are now in the hands of the Commanders-in-Chief. The examination the men will have to undergo will be a rather stiff one and comprises questions in arithmetic, in the mensuration of surfaces and solids, in the construction and fitting of the engines and boilers in use in the Navy, in the combustion of fuel, in the keeping of engineers' store accounts, and many others questions connected with their new duties. A number of the chief engine-room artificers at Portsmouth are said to be against the scheme and do not intend to endeavour to obtain a warrant, but we should think this number must be very small.

Conditions and Pay.

Certain conditions will have to be fulfilled by the men aspiring to the new rank who will be selected from the engine room artificers and chief engine-room artificers. They must have not less than ten years' continuous service, they must be 35 years of age, and must pass the examination referred to above. When the men become full-fledged artificer engineers they will rank with carpenters, according to the dates of their respective warrants. Among the other conditions, which are certainly very liberal, they are to receive £25 on promotion towards the expenses of outfit. The pay is good, for the new artificer engineer will be much better paid than the present gunner, boatswain, or carpenter, almost as well paid in fact as a junior lieutenant. Thus an artificer engineer will receive 8s. 6d. per diem under five years, 9s. 6d. over five years, and 10s. 7d. over ten years; while a gunner, carpenter, or boatswain only receive 5s. 6d. per diem under five years, 7s. 6d. over five years, 8s. over ten years, and only 9s. over fifteen. Junior

lieutenants draw 10s. per diem. This all goes to show that the engine-room department of a modern man-of-war is rapidly increasing in importance. If this step which the Admiralty have taken turns out to be as successful as is anticipated, one very good thing will have been achieved. It will be the means of training a class of men whose knowledge of their work and qualifications can be thoroughly relied upon in case at any time we were in want of engineer officers. They could well take command of the engine-room department of destroyers and similar craft, the number of which is increasing so much ately.

U.S. Naval Engineers and the Executive Branch.

Reports to hand from the United States state that at last naval engineers of that country have been granted what they have been agitating for for some years past. The result of a protracted debate, in which both executive and engineer officers took part, is that the rank and status of engineer officer is now to be abolished, and from the time when the new regulation comes into force all commissioned officers in the United States Navy will be executive, and their time will be equally divided between deck duties and the engine-room. This, of course, means that the officers of the future will have to make a much more thorough study of engineering than is at present the case, although it must be confessed that naval officers of the present day, no matter of what nationality, have quite enough to learn without this additional burden. Under the new rules engineer officers at present holding commissions in the junior grade will not be eligible for ten years to command a ship or undertake any of the duties at present carried out by the executive officer. The American naval cadet of the future will pass five years at the Naval Academy, another six years will be passed at sea as an ensign, partly on deck and partly in the engine-room, and at the end of this time he becomes a lieutenant, and can specialise in engineering, gunnery, or torpedoes, as he chooses. There can be no doubt that this is what will happen in most of the navies of the world before long. Secretary Long, in the course of some trenchant remarks on the United States Navy in general, said "Naval service is not limited to the sailing of a ship and the firing of a gun. A modern man-of-war is a compendium of industrial inventions and appliances: a business and manufacturing plant as well as a fighting machine. A large part of its crew is engaged in skilled labour—the running of engines and the movement of machinery. An officer's duties, and the demands upon his professional resources, whether in the movement of ships or in the work of the mechanical departments connected with their make and repair, involve problems of construction, the use of the dynamic forces of air, water, steam, and electricity, and the nice adjustment of batteries, guns, and gear of enormous tonnage, yet moved on hair lines and by a touch of the finger. All this calls for advanced requirements on the part alike of those who command and direct, and of those who construct and operate."

Increasing the German Navy.

The new German naval programme, which the Kaiser is so persistently trying to force on the German nation, has not met with an enthusiastic reception, despite the teaching which has been forced upon the citizens of the Fatherland with the object of instilling into them the importance of a great and powerful Navy. But there is little doubt that the Kaiser means to carry out his pet project, and therefore we must not treat the matter lightly, for if £25,000,000 sterling is to be spent on construction during the next seven years the result will be that Germany's fleet will have to be reckoned with by the Admiralty in addition to those of the other great Powers. The Bill was hailed by the Colonial party with undisguised satisfaction, but other Prussian politicians were not quite so enthusiastic about it, and the Parliamentary representatives of the South German States were dead against it. For the ten years 1888-1897, France only spent a sum equal to that mentioned above on new construction. In addition to the many battleships now under construction, the Germans propose to lay down seven battleships and nine cruisers, in addition to other vessels which will be required to take the place of those in the German Navy to-day, which are rapidly becoming obsolete. Among these are the ironclads *Baden*, *Sachsen*, *Wurtemburg*, *Deutschland* and *Kaiser*, all of which will become obsolete in 1904, supposing we take the 25 years as the term of a battleship's life as accepted by the German Naval department. Full provision is made in the Bill for manning the new ships when they are completed, and a 5 per cent. margin is to be kept in reserve.

A Navy League Manifesto.

Much attention has been attracted by an important manifesto which has been issued by the Navy League, in view of the Naval Estimates which are now being framed. There appears to be an idea prevalent that the Government this year intend to rob Peter to pay Paul, the latter representing the Army and the former the Navy, and it is presumably to prevent this that the memorandum has been sent out. It commences by pointing out the isolated condition of Great Britain, asserting that this country is not only friendless, but the Great Powers and the United States of America seem to have found a point of agreement in the evolution of a common hatred to this country. France has 17 causes of difference with us, three of which, says the memorandum, may compel the Cabinet to accept or declare war at 24 hours' notice. The naval preparations of Russia and France are played upon, and the vigorous Russian support of French pretensions wherever they come into conflict with Great Britain, is said to be the price which Russia is to pay for an alliance between an unbending despotism and a revolutionary republic. English sea power is the obstacle in the way of the realisation of Russia's hopes. "Germany has no less to gain from the ruin of England than her two neighbours. The German Emperor merely interprets the convictions and consults the interests of his people in shaping his policy for England's fall; and without haste or rest adapting his naval and commercial strategy so as to inflict the deadliest injury upon our most vulnerable spot precisely at the moment when collision with other Powers, the possible breakdown of our army system, and the absence of home-grown food, combine to raise the cost of living, and thus infuriate unemployed masses of British voters with the present organisation of society." It is also pointed out that the attitude of the United States annually grows more hostile to this country. Austria, Italy and Japan are sometimes regarded as possible allies, but the Navy League is not inclined to rely upon either of them for various reasons.

Our Unfitness for War.

As showing how unfit we are at the present moment for a struggle with any of the Great Powers of Europe, the circular goes on to point out our weakness in battleships, our lack of seamen, and the advanced age of our Admirals. "The British Fleet has lost the standard of strength in battleships established by Nelson, and confirmed by the committee of Admirals in 1889. In 1899 we shall be, relatively to France and Russia, in a worse position than we were in 1889, when the Naval Defence Act was passed, while the actual number of battleships now available is eighteen below the standard of strength considered necessary in 1889, since which date no revised standard has been put forward. Command of the sea is necessary to our national existence. The present lack of battleships really means abandonment of naval supremacy, and no official explanations can prove the contrary." Speaking of our lack of seamen, the Navy League considers that the suspension of construction during the present year, added to the effects of the dispute in the engineering trade, have filled France and Russia with new hope. Our officers and seamen are declared to be insufficient to man the fleet we now possess, and "the deficiency of 700 lieutenants and 300 engineers only makes worse the fact that there is no reserve to repair the waste of war." Altogether the manifesto must be regarded as an extremely pessimistic one, and is not likely to stir up anything like the amount of enthusiasm which resulted in the Naval Defence Act

The Engineering Dispute.

The effects of the long cessation of work in the shipbuilding yards owing to this unfortunate affair is now becoming more apparent than ever. And it is not only in the private yards that work is at a standstill, but this is what will very soon be the case in the Government yards, as is illustrated by the slow progress of many of the battleships now on the slips. The *Gladiator* has certainly been launched, but she is not much better off for this; the *Canopus*, which was built on the same lap, has now been launched, but the completing of both of these vessels has been terribly hampered by the dispute. It is now found that the *Ocean* will not be in a condition for launching until May next, thus making it impossible for Devonport to make a start with the new *Implacable*. The determination of the Admiralty to build engines and boilers in the public yards is laudable, but

unfortunately the plant is totally inadequate for the work. Great difficulty too has been experienced at the various yards in finding work for all the men, especially drillers and rivetters, and thus the amount of money paid for wages decreases week by week, and very shortly the work at the dockyards will be in a state of stagnation. The *Daily Chronicle*, which has all along gone dead against the Admiralty and masters, has now come out with the statement that the Admiralty has been helping the employers against the men. This paper says that the Admiralty contracts have no strike clause and that, therefore, the Admiralty has a right to demand the delivery of the things contracted to be supplied at a stated time; and failing such delivery, the contractor is liable to have the contract quashed at once. We should like to know, supposing the contracts were quashed, what good would be done. There is nowhere in Great Britain where the vessels could be built except at the yards which now have the contracts, so perhaps the *Daily Chronicle* would like to have our warships "made in Germany" or some other foreign country.

A Record Coaling.

The recent coaling record accomplished by the *Magnificent* at Vigo, is it appears, the best as yet made. The whole of the Channel Squadron was coaling, and most of the vessels averaged over 100 tons an hour. But the *Magnificent's* performance was far and away in front of this, for she averaged over 160 tons an hour, the *Majestic* being a little behind her with 141 tons. In one hour the *Magnificent* took 174 tons, and the *Majestic's* highest record for one hour worked out at 171 tons. Both vessels had to break bulk and "coaled" from one side only, the ship's company filling the bags. The rate at which the coal was taken in is of course simply marvellous, and it can quite be believed that officers turned to and helped the men by way of encouraging them. At one time the *Magnificent* was taking in over three tons a minute. She commenced coaling at 8 a.m. from the collier *Pontypridd*, carrying 2,038 tons of coal, and finished at 12.50 p.m., having taken in 775 tons in 4 hours and 50 minutes. The *Majestic* commenced at the same time, but knocked off at 12.35, and took in altogether 670 tons. A few days later the following memorandum was issued to the squadron: "The Vice-Admiral congratulates the squadron on the recent very successful coaling, which has beaten all previous records. *Magnificent*, *Majestic*, *Mars*, and *Resolution* very good. The Vice-Admiral considers this record will be improved upon when the gear demanded for coaling is supplied. Great credit is due to the commanders for their organisation, as well as the good working performance by ships' companies. He would impress upon the squadron the necessity of making coaling the most important evolution they are called upon to perform." In the days of masts and sails "Make all possible sail" was regarded as the premier evolution, but in these modern days of steam and steel coaling has evidently taken its place.

Fighting Machine and Pleasure Yacht.

The new Russian protected cruiser *Svetlana*, which has just been completed at Havre, has many special features about her, the chief being that she is a powerful, speedy, and effective man-of-war, and is also a comfortable private yacht. The official designation of her is "a cruiser at the disposal of the Grand Duke High Admiral." Her dimensions are:—Length, 331 ft. 4 in.; beam, 42 ft. 8 in.; depth, 33 ft. 9 in.; extreme draught, 18 ft. 9 in, and displacement 3,828 tons. She is built of steel and sheathed with wood and copper. She is fitted with two powerful engines of the vertical triple-expansion type, driving twin-screws, and is expected to attain a speed of close on 21 knots an hour. Her engines were estimated to develop 8,500 H.P., but have already exceeded this by 100, and at the final steam trials it is calculated that they will reach 10,000 H.P. She has 18 Belleville boilers in three groups of six each. With full bunkers she will have a radius of 12,000 miles at 10 knots speed. She has already undergone her preliminary coal consumption trials, but her splendid interior fittings and appliances still require much to be done to them before she is completed. Although the *Svetlana* is so luxuriously furnished throughout, all the appliances that modern ingenuity can devise have been made use of to make her an efficient fighting machine. Her armour consists of a protective deck and glacis, the latter covering the engines. Above the armour deck, which stretches the ship's entire length, is a cofferdam surrounding the vessel. This cofferdam contains an automatic device in use in the Russian Navy for stopping shell perforations. Her two sets of engines are entirely separated by a longitudinal bulkhead, and the three sets of boilers are in separate compartments, which plentifully subdivide the hull. She has a wonderfully strong armament, and is said to carry more powder and shell than any other vessel of her class.

The Trials of the "Pelorus."

The pessimistic outburst of Sir George Elliot in the *Morning Post*, which was directed chiefly against the *Pelorus* type o cruiser, has proved unfounded after all, for the vessel, on her recent 71 hours run, proved herself to be an exceedingly smart little vessel. She was favoured with good weather from the day she started on the trip until within a few hours of her reaching harbour. She managed to get across the Bay in fine weather, and was running down the Spanish coast two days later. She continued her course until a little to the north of Cape St. Vincent, and then turned. For the first 12 hours of the 72 she averaged 16·42 knots, running a total distance of 197 miles with 3,516 H.P. For the last 60 hours she averaged 17·3 knots, running a total distance of 1,038 miles with a H.P. of 4,277·8 Thus she covered a total distance of 1,235 miles in the 72 hours, the average speed for the whole journey being 17·15 knots. The total coal consumption for all purposes was 305 tons. The coal consumption was rather high, but, doubtless, a good deal was used for other purposes than getting up steam. She would have evidently kept up a knot more than this as long as her coal supply held out, proving herself a vessel not to be despised even in these days of high speeds.

Launch and Trials of Cruisers.

The *Vindictive*, cruiser, which has within the last week or so been floated out at Chatham, is of the same class as the *Arrogant*. She was named by Lady Nicholson, wife of the then Commander-in-Chief at the Nore, in the presence of a very distinguished company. The length of the new vessel is 320 ft.; breadth, 57 ft. 6 in.; mean draught, 21 ft., and she displaces 5,805 tons. The engines with which she is supplied were built in Chatham Dockyard, and are able to develop with natural draught 10,000 I.H.P., with a speed of 19 knots. Her coal capacity is 1,175 tons. She has a protective deck composed of two thicknesses, one on the flat of 1 in., and one of ½ in., and on the slopes of 2 in., and one of 1 in. Her armament consists of four 6-in., six 7-in., eight 12 pounders and three 3-pounders quick-firing guns, in addition to some smaller pieces. The type vessel *Arrogant* met with a slight accident as she was being moved out of Devonport for her coal consumption trials, and damaged her propeller, necessitating the postponement of the trial. In the preliminary trials of the *Diadem*, the vessel exceeded a speed of 20 knots, and with 88 revolutions she was able to keep up a steady speed of 16·8 knots. On the preliminary run only half her boilers were used. Her guns are expected on the 1st of this month, and it is hoped that her steam and gun trials, which commence about the 11th inst., will form a consecutive series. All the vessels undergoing trials appear to have met with rough weather, and this factor considerably interfered with the three hours commissioning trial of the *Porpoise*. The *Bonaventure* met with a slight mishap too towards the close of three hours trial in the Channel, her starboard engine breaking down, and she had to fight her way through some very stormy weather in Plymouth by means of her port engine. The *Venus* recently carried out two trials in the Channel, one of three hours at full power, and one of 30 hours at one-fifth power, in order to compare her results with those of the *Arrogant*. The *Venus* is fitted with cylindrical boilers, whereas the *Arrogant* is fitted with Belleville. On the whole the results achieved came up to expectations. The machinery trials of the new sloop *Albert* have been reported satisfactory.

Torpedo-Boat Destroyer Trials and Launches.

The *Express* torpedo-boat destroyer, which has just been launched from the yard of Messrs. Laird Brothers, Birkenhead, is said to be larger than any other destroyer yet built. She is 235 ft. in length and is designed to have a speed of 33 knots, which will make her the fastest vessel afloat. The launch took place in the presence of a distinguished company, and Mrs John Laird performed the christening ceremony. The three-hours contractors' trial of the *Dasher* took place at Portsmouth, but she was only able to develop a speed of 25 knots, although she is a 27-knot boat. Her engines are not exactly new but she has been reboilered at Messrs. Earle's at Hull, and although she was required to develop 3,800 H.P. her engines did not get

beyond 3,619, and in the last hour of the run the fans gave out. The weather was very rough, the boat constantly shipping seas. The *Lightning* and *Hornet* encountered very bad weather during the latter part of the half-weekly instructional cruise. They left Portsmouth on a Monday but had to return to port. On Tuesday following it was intended to run to Portland and the Channel Isles, but the *Hornet* rolled very badly, causing her forward guns to be immersed very frequently, and her fore-bridge sustained serious damage. The defects she sustained are now being made good. The speed trials of the *Crane* have turned out very satisfactory. Before going out she carried out her steering, stopping, and starting trials satisfactorily. On her second three-hours, speed trial she was required to maintain a mean of 6,000 H.P. and a speed of 30 knots. However, she exceeded this H.P. by 267 with a speed of 30·347. The *Dasher*, which has just had her locomotive boilers taken out and replaced by Thornycroft water-tube boilers has been out for a 12-hours coal-consumption trial, but was only able to run for eight hours owing to the light failing; but of this eight hours only six and a-half were taken up in the trial. With 420 I.H.P., she developed a speed of 13·5 knots and the consumption was 2·4 lbs. per unit of power per hour. The *Violet* had her initial three-hours full power trial at Portsmouth recently. She was required to maintain a speed of 30 knots, but the mean speed of the three hours and of the six runs on the measured mile was 29·7 knots.

A Great Stage Sailor.

The sudden and tragic termination of the career of that great actor, William Terriss, will not only be regretted by the general public, but more so by the seamen of Her Majesty's Navy, both high and low. He had probably represented more Naval characters than any other actor of modern times, and made his greatest hit in naval representations as David Kingsley, in the "Harbour Lights," in which he looked the brave sailor he represented to the life. It has been stated that he was a midshipman in the Royal Navy, but doubtless many who read these columns will be able to discover for themselves whether this is true, as it is doubted by many. However, there is no doubt he had had a good connection with sea life, which accounted to a great extent for his romantic cheeriness and breezy ways. In "Black Eye'd Susan" he gave a very lifelike representation of the seaman which Douglas Jerrold, the talented author of the play, so well portrayed, and sailor parts of any sort whatever seemed to afford him more scope for his great talent than anything else he undertook.

Portsmouth Dockyard.

The spell of bad weather which we have been passing through during the past month has seriously interfered with the proper carrying out of trials, and has been the cause also of several slight accidents to cruisers and torpedo-boats destroyers. The forward sponsons of the *Porpoise* spooned up great green seas and tossed them on the deck, which was completely awash best part of the time. The *Glatton* has been taken out of No. 11 dock, where it is proposed to lay down the *Pandora*. Those who will be responsible for her construction are already commencing their work. Com. Travers and the crew of the *Thrasher* have taken over the torpedo-boat destroyer *Bat*, which was commissioned here. The *Bat* will report for service in the Devonport instructional flotilla. The new battleship of the *Majestic* class, which is to be laid down here, will be the *Formidable*, a name well-known in the fighting annals of the British Navy. The old battleship *Resistance* still lies here, waiting to be sold. It will be remembered that the old vessel was covered with 4-in. armour, and then when she had become practically useless she was used as an experimental ship for the testing of shot, shell, and torpedo. Then her plates were removed, and it was seen that the shot holes in her had done their work very thoroughly. The new battleship *Cæsar* will be commissioned here on the 13th inst. for service with the Mediterranean fleet. The *Cannibal* is at present lying in the repairing basin here. She is to be ready for sea by March next, but has yet to have her 6-in. guns mounted. It is fully expected here that one of the principal items in next year's Estimates will be a sum of money with which to commence work on the electrical installation, about which so much has been said.

Devonport Dockyard.

The home coming of vessels for the Christmas holidays commenced a week beforehand, and the Western Division of the Channel Squadron made its appearance somewhat sooner than was expected. A number of the ships had defects which required attention, but the work in many of the departments being slack these were taken in hand at once. The *Curacoa* arrived from the Canary Islands, the *Sirius* from the Mediterranean, with the relieved crews of the *Hebe* and *Fearless*, and the *Cambrian* also from the Mediterranean, where she has been relieved by the cruiser *Venus*. The new first-class battleship, which will be commenced here as soon as the *Ocean* is out of the way, is to have the name of the *Implacable*. Her designs have not been definitely arranged, but she is to have a displacement of 14,900 tons. This is some 2,000 tons heavier than the *Ocean*. In the ordinary course of events over £50,000 would have been spent on the ship by the spring of this year, but the delay in the launch of the *Ocean*, owing to the engineering dispute, the new battleship could not be laid down as early as was expected. The new torpedo-boat destroyer, *Flying Fish*, arrived here early last month from Jarrow-on-Tyne, where she has been built. She encountered somewhat severe weather, but proved herself a good sea boat. The journey took just twenty-four hours, her highest speed being 22 knots. A report has been sent from here to the Admiralty dealing with the progress made by the *Ocean* since her commencement. At present she weighs about 5,000 tons, but when she is launched she will weigh fully 7,000 tons. It has been estimated that her average weekly growth has been about 112 tons.

Chatham Dockyard.

The principal event of the past month here has been, of course, the float out of the *Vindictive*. The ceremony was probably the last act of any importance which Admiral Sir Henry F. Nicholson will take part in his capacity as Port-Admiral. The next vessel which will be commenced in the dock she has vacated will be the *Pioneer*, a third-class cruiser of the *Pearl* type. This ship will be 300 ft. in length, 30 ft. 6 in. in breadth, and will displace 2,135 tons, with a mean load draught of 13 ft. 6 in. She will be fitted with water-tube boilers, and her engines will develop 7,000 I.H.P. with forced draught, and 5,000 natural draught. She will, it is calculated, have a speed of 20 knots under forced draught, but, with natural draught, will be able to maintain a speed of 18½ knots for a considerable length of time. Her armament will consist of eight 4-in. and eight 3-pounder quick-firers, with machine guns and Whitehead torpedoes. She will be used chiefly for despatch work and for scouting duties. The yard suffered very considerably in the late gale, and at one time it was thought that the *Vindictive* would launch herself, there was so much water under her. The flow of water into the slip on which the *Goliath* is building was also extensive, and those at work on her had to beat a hasty retreat before the rising tide. The water overflowed the Gunwharf wall, and the whole of the guns, shot, and shell are said to have been submerged. A great deal of energy has been expended upon the *Goliath* lately, something like 2,000 hands being employed on her. Preparations for her launching will commence very shortly. Other work in hand includes the repairing of the induced draught fans of the *Illustrious* in readiness for her official steam trials, and internal repairs are going on in the *Dreadnought*, whose boilers have been taken out and fresh supports for a new set put in.

Sheerness Dockyard.

This yard is at present very busy, and much overtime is being worked. The *Racoon* has been undergoing refit, and has had her 6-in. breech-loading guns removed to make way for 6-in. quick-firers. She is to be commissioned for the East Indies station early this month. The disastrous effects of the late storm ought to have had first mention. Nearly every one of the dockyard employés have suffered from its effects in one way or another. The affair was a very serious one for this port, which was isolated for nearly two days by the stoppage of the railways, and the partial destruction of the town pier. Admiral Nicholson did a good deal towards lessening the evil wrought by the flood. His successor, Vice-Admiral Sir Charles F. Hotham, has since hoisted his flag here. The steam yacht *Wildfire*, which serves as his flagship, was in collision recently with a brigantine, which drifted on to her starboard quarter. In addition to other slight damages the *Wildfire* had one of her boats stove in. Shortly before Christmas orders were given for the torpedo-boat destroyers attached to the Sheerness instructional flotilla to cease running until after the holidays. The *Haughty*, which has been in hand here for some weeks, is to resume her duties as senior officer's ship this month. The *Snapper* has been docked for repairs. The *Alert* has left here for the North

America and West Indies station. The special service vessel *Hearty* is at present staying here undergoing her annual refit. Christmas leave was given to her crew. Captain J. C. Burnell, the Superintendent of the yard, has just vacated his appointment here on retiring from the service. He will be succeeded by Captain A. W. Moore.

Pembroke Dockyard

Work at this yard is chiefly in connection with the new Royal yacht, which is being pushed forward with all possible speed. The remaining months of the present financial year will, it is hoped, see a great deal of work accomplished on the vessel. Overtime was resorted to in the case of the moulders engaged casting the stem. The foundry here has been fitted with electric light, and in order that the bronze stem and stern post of the new yacht should be cast as early as possible, overtime has been resorted to practically all round. Considerable suffering has been caused the wives and children of many of the men taking part in the engineers' dispute at this port, and a fund has been raised wherewith to alleviate their misery. The programme of work for the new financial year is the subject of much speculation here. By many it is thought that the present work will be sufficient to keep all the hands employed, but other officials think it absolutely necessary for the Admiralty to make provision for a new ship to be laid down early in 1899. For the next nine months work for a great number of men will be found on the *Andromeda*, and the Royal yacht will also keep a great number of hands busy, as £20,000 is to be spent for labour alone. The *Spartiate* does not appear to make much headway, and it is not very probable that she will before the *Andromeda* is disposed of.

THE VOLTEX PROCESS OF ELECTRIC WELDING.

MOST of our readers are no doubt acquainted to a more or less extent with the process of electric welding, as carried out by the Thomson-Houston and other methods, which require an expensive installation, are costly in use, and moreover, are only adapted for comparatively few kinds of work, while outside these limits there lies an immense range of work for which they are found to be both mechanically and economically unsuitable.

At the same time it must be remembered that electric welding has long been recognised to offer for many purposes numerous advantages over the ordinary method of welding in a smith's fire. Many attempts have also been made to use electricity for brazing purposes, owing to the numerous advantages which a simple electrical method would have over the ordinary gas and coke brazing hearths; but hitherto, we believe, those attempts have been failures as far as practical work is concerned.

It will be readily acknowledged that any process by which a flange can be brazed on to a pipe, or a split in a pipe made good, or a fractured gun-metal or iron casting joined up without removing the article from its position, is a valuable addition to the arts.

THE VOLTEX PROCESS OF ELECTRIC WELDING.

We understand that such a process is being exploited by the Electric Metal Working Syndicate, Limited, of 61 and 62, Gracechurch Street, London, E.C., and we have pleasure in placing before our readers an illustration of the device. The apparatus consists of a carbon holder, and a pair of carbon electrodes. In using the apparatus an arc is struck between the electrodes, and owing to the material of which these are made, and their angular arrangement in the tool-holder, a powerful flame like that of a gas blow-pipe, but of much greater range of temperature, is projected from between the adjacent ends of the electrodes, and is directed upon the material to be heated.

The portion of the flame nearest to the carbon points is of the highest temperature, and it gradually decreases in temperature as the distance from the electrodes is increased.

The workman, therefore, by merely varying the distance of his work from the electrodes can apply to it a blow-pipe flame of a temperature ranging at will from that of the arc itself down to a temperature comparable to that of the ordinary gas blow-pipe.

By varying the voltage or pressure of the current, by means of a regulating switch, the power of the blast itself can be increased or diminished at will. Beyond the make and break switch, preferably one controlled by the foot, and a regulating switch, if the same tool has to be used for a very wide range of work, the whole of the apparatus required is shown in the illustration, although the tools may also be used in conjunction with the various kinds of machines used for pressing or hammering together the metals to be joined, as for example, in welding iron and steel.

The process is thus an extremely simple one, and the tools may be moved from place to place in the workshop, or factory, or on board ship, as may be convenient; the only necessary feature being a source of electric current, say of 50 volts pressure as a minimum.

The diagram illustrates a workman using one of the larger tools for welding together the plates of a boiler. In order to facilitate the manipulation of the tool and to take its weight off the workman's hands, it will be noticed that it is suspended from one end of a cord which is passed over an overhead pulley, the other end of the cord carrying a balance weight, or if preferred an elastic cord may be employed.

In welding iron or steel, the metal is heated at the joint by directing the electric blast upon the ends to be joined, and as soon as the welding heat is reached the parts are pressed together in a suitable machine, or hammered according to the nature of the work. By means of this process also, we understand that castings which are turned out with defects, such as blowholes, can be made absolutely perfect at a nominal cost; further, that complicated patterns can be cast in sections and joined together with just as good results as if they had been cast in one piece, as there is no loss of strength; and if metal of the same kind is used throughout, there is no means of detecting where the joint was made, even if the castings are broken across.

A good example of the utility of this process was in the case of the body of a Worthington pump which was broken across, and was subsequently mended in about five minutes by fusing the metal together again, thereby effecting a saving of at least £8, quite apart from the loss of time and the labour in putting in a new frame.

It is claimed that the advantages of the process are—Firstly, it is so simple that any workman can use it efficiently after a very little practice, the tools being as easy to use as a soldering iron; secondly, it is economical; thirdly, it requires practically no outlay for installation, provided a source of electric current is available; fourthly, the apparatus is such that it can be taken to the work, instead of the work having to be taken to the tool; fifthly, work can be executed which is impossible by other methods; and, lastly, malleable iron and steel, as well as cast-iron, can be treated by the process, and if requisite can be raised even to the point of fusion without being rendered hard and brittle.

The wide application of this process would appear to give it a scope for great utility on board ship, not only in the installation of new work on board ship, but in the repairs and renewal of old work.

THE NEW ROYAL YACHT.

THE first keel plate of the new Royal yacht was formally laid in position on the blocks in the building slip, Pembroke Dock, on December 16th last, by Mrs. Watson, wife of Captain Watson, superintendent of the dockyard. Sir W. H. White, Director of Naval Construction, Captain Watson, and most of the principal dockyard officers, witnessed the ceremony, after which cheers were given for the Queen by a number of men employed on the work in connection with the ship. The new yacht, the name of which has not yet been published, will be 380 ft. long, and we understand that, in compliance with express command of her Majesty, the general outward appearance of the vessel is to conform as nearly as possible with that of the present yacht, the *Victoria and Albert*, so far as a screw boat can be made like a paddle-boat. Accommodation for the Queen's household is also to be made in the ship, so that when her Majesty travels her retinue can accompany her.

We understand the plans of the vessel have been submitted to, and been considered by, the other members of the Royal family, who will be interested in the matter, the Prince of Wales and the Duke of York having given the subject special attention. We take this opportunity of congratulating London engineers on the fact that the machinery for the new yacht is to be made on the Thames, as it was in the case of the present yacht, the contract for the engines having been secured by the well-known marine engineers, Messrs. Humphreys, Tennant & Co., of Deptford. It will be remembered that the engines of the *Victoria and Albert* were manufactured by Messrs. John Penn & Sons, of Greenwich.

The new vessel is to be propelled, we believe, at 22 knots per hour, and will be fitted with engines of 11,000 I.H.P. The boiler pressure is to be 300 lbs. per square inch, which is to be reduced at the engines to 250 lbs. per square inch.

She is to have twin-screws, and each screw will be driven by a set of 4-cylinder triple-expansion engines, having a high-pressure cylinder 26½ in. diameter, intermediate cylinder 41½ in. diameter and two low-pressure cylinders of 53 in. diameter; the stroke in each case being 3 ft. 3 in., and the intended revolutions being 140 per minute. The condensers will have a cooling surface of 12,000 square feet.

Special attention is to be paid to the proper balancing of the parts of the machinery, in order that the comfort of her Majesty shall not be interfered with in any way, by preventing the vibration and noise set up by the movement of unbalanced parts of machinery at high rates of speed, a feature that is very marked on many quick running jobs; the system of balancing to be adopted is, we understand, that known as the Yarrow Schlick-Tweedy.

The engines will be supplied with steam from 18 Belleville boilers, having a total heating surface of 26,000 square feet, and a total grate surface of 840 square feet. It is to be regretted, we think, that this vessel is not to be fitted with boilers that are thoroughly English in design as well as in make.

It may be interesting no doubt to our readers to have before them for the purposes of comparison, a few particulars of the engines of the present yacht, the *Victoria and Albert*, so we give them as follows:—The engines, which consisted of a pair of oscillating cylinders, each 88 in. in diameter, and 7 ft. stroke, were of 600 N.H.P., and indicated 2,980 H.P. The pressure in the boilers is 23 lbs. per square inch, and when the engines make 25·4 revolutions per minute, they propel the vessel at a speed of 16·981 knots per hour. The paddle wheels are 30 ft. 11 in. diameter over all, and at the above speed gave 18 per cent. slip.

We understand that this new yacht is not to be ready for some time, in fact the engines are not to be delivered till the early part of 1899, but when finished we trust she may have as successful a life as the boat she is to replace.

FRANKENBERG'S LIFE-SAVING APPLIANCES.

TOO much attention to the subject of the saving of life from marine disaster cannot be given, and every appliance brought out for the purpose should be carefully considered from every necessary point of view.

Fig. 1.

We have had an opportunity of inspecting the life-saving appliances which have lately been invented by Mr. E. W. Frankenberg, of 1, Vernon Chambers, Bloomsbury, W.C.

In order that the matter may be viewed in the

Fig. 2.

proper light, it will perhaps be well to point out some of the necessary qualifications of a really satisfactory life-saving dress.

It must be first understood that, as a rule, life-saving dresses are only required in the case of an emergency, so that a dress must be portable, easily put on, and free from any risk of damage or neglect on the part of the wearer; for when called into use the wearer is liable to be excited, and nothing but the simplest contrivances are capable of proper attention. The dress is merely a water-proof sack, into which one steps dressed in ordinary clothes, and by pulling on the cords that encircle the neck the fixing is completed. The object of making the cloth waterproof is that it prevents any moisture penetrating the ordinary clothes, over which it is slipped, so that the heat of the body is maintained, and there is no risk of numbness follow

Fig. 4.

Fig. 3.

ing a long exposure. This is a most important matter as there is no doubt that a large number of people succumb from sheer exhaustion due to the abstraction of heat from the body, instead of suffocation by drowning. In the illustrations, Fig. 1 is a view of a man wearing the dress on land, and Fig. 2 shows how the dress works in the water; Fig. 3 shows a ladies' belt; Fig. 4 a pair of bathing drawers; Fig. 5 a boating or yachting pillow; and Fig. 6 a life-boat crew dressed in the garments.

To come to a more minute description of the garments, the full dress is, as we have already said, made of rubber-proofed cloth, the feet being weighted so as to give a proper position in the water, the sleeves being provided with elastic rubber cuffs, which grip the wrists and prevent any water from entering the sleeves.

Fig. 5.

Although the dress is air-proof, it does not depend upon air for its supporting power, that being imparted by a specially treated padding, which is so buoyant that a small cushion made of the material is capable of supporting eight or ten persons.

In addition to the dress there is a water-proof hood, which can be drawn over the head in rough weather, and mittens for the hands. The swimming drawers

are specially suited for teaching people to swim, but are also useful for those who can swim, as they will support the body, in case of cramp or accident, until assistance can arrive. The ladies' belt needs no explanation, and the advantages of having cushions for boating and for use on board ship, as means of reclining and also of life-saving, if necessary, should make this type of device invaluable.

It must be noted as an important feature, that should the outer cloth of the dress be torn or punctured it will not affect the supporting qualities of the dress, as the padding of which is perfectly water-proof as well as the cloth. The dress is light in weight, that for a full-grown man weighing about 8 lbs., and it can be packed into a very small space. In order that the dress shall afford protection against sharks, it is made of a dark or black colour, as it is said that these fish do not touch anything black or which has the slightest smell of india-rubber about it.

There is sufficient spare buoyancy to admit of a person carrying sufficient food to last for at least a fortnight. The ease of movement of the wearer is not impeded in any way by dress, so that he can swim a considerable distance without extraordinary exertion.

Fig. 6.

INSTITUTE OF MARINE ENGINEERS' ANNUAL CONVERSAZIONE.

THE members of the Institute of Marine Engineers held their ninth annual conversazione at the Town Hall, Stratford on Friday evening, December 3rd. The big collection of exhibits' mostly connected with marine engines, conspicuous in former years, was this year kept within somewhat smaller limits, thereby securing more space for the members and their friends. On entering the main hall, through an ingeniously arranged porch, in which the house flag of the Institute was the prominent feature, the visitor could not fail to be attracted by some of the models, sections, etc., as well as by the fine pictures and paintings of ships which filled the window recesses. These had been arranged under the direction of Mr. F. W. Shorey, the hon. treasurer. Much enjoyment was afforded by the organ, which was splendidly played by Mr. H. L. Balfour, of the Royal Albert Hall. Mendelssohn's "Wedding March" was one of the selections, and its rendering could not fail to delight all who heard it. Light refreshments were served in the Council Chamber, where all were made welcome. In the committee room Messrs. Arthur C. Brooks and Cecil M. Hepworth showed a number of interesting and beautiful "living photographs," including a short descriptive piece, "The Storm," and pictures of the Diamond Jubilee celebrations. Large numbers of persons witnessed these with much pleasure. There were about 480 present. Amongst the number were the following: President of the Institute (Mr. J. Fortescue Flannery, M.P., J.P., M.Inst.C.E.), Sir A. J. Durston, K.C.B. (past President), Mr. John Clark, Mr. J. Macfarlane Gray, Mr. C. S. Du Sautoy, Mr. J. H. Thomson, Mr. A. W. Robertson, and Mr. R. Leslie, vice-presidents; Mr. T. F. Aukland, Mr. H. E. Lester, J.P., and Mr. W. Reid, companions; Mr. T. Milton, chief engineer Lloyd's Register of Shipping; Mr. T. W. Wailes, Mr. A. E. Smithson, and Mr. T. A. Reed (representatives of Cardiff), and others.

In the main hall Miss Masie Riversdale gave a good rendering of "When the heart is young," and was warmly applauded. Mr. Sydney Jamieson sang "The auld plaid shawl" very finely; "Mary" was given by Mr. Sadleur Brown; and a cornet solo, "Ora pro nobis," with organ accompaniment, was finely played by Major J. H. Taylor. Zither banjo solos were played by Mr. Arthur Hilton; and Mr. G. T. Miles so much pleased the company with a harp solo that he was requested to give a second. A humorous sketch by Mr. Roland Henry, and a pleasing shadowgraph entertainment by Mr. Frank Kennard were also given.

Meanwhile the members of the council (Messrs. J. H. Thomson, S. C. Sage, John Adamson, A. Blair, J. Blelloch, A. Campbell, A. G. Crichton, R.N.R., J. R. Ruthven, J. T. Smith, R.N.R., and W. Taylor (convener), with the hon. treasurer (Mr. F. W. Shorey), the hon. secretary (Mr. James Adamson), and the assistant secretary (Mr. C. G. Newby), were occupied in welcoming the guests and making one and all feel at home—a feeling which pervaded the whole of the proceedings.

The President, Mr. J. Fortescue Flannery, M.P., J.P., M.Inst.C.E., was received by a reception committee, consisting of Messrs. C. S. Du Sautoy, James Adamson, T. F. Aukland, John Clark, H. A. B. Cole, R. Leslie, S. C. Sage, and J. H.

Thomson, and at a convenient interval appeared with other supporters on the platform and delivered an address, which we refer to in our "Editorial Notes."

Mr. James Adamson (the secretary) said the pleasing duty devolved upon him of asking them to join in a hearty vote of thanks to the President for the address to which they had listened with very great pleasure. They had had a good deal of food for thought placed on record, and he hoped that at their future meetings there would be many papers issuing from some of the thoughts put before them. The historical part of the address, he had no doubt, a great many of them were burning to discuss. His thoughts, while the President was speaking flowed back to the time of the Egyptians, and they there found evidence that the priests used steam; and yet it took a long time for the idea to be buried in the earth only to be developed about 100 years ago. When they came to look upon shipbuilding from the naval architect's point of view they found that the question, "Can iron swim?" was put before the world a good many hundred years ago—he should say thousands of years of years (B.C. 893)—before the idea was unearthed and brought into practical shape, when the first iron barge was built and launched on one of the canals (about 1787). He did not want to occupy the time by enlarging on points which he had no doubt many of them would discuss and would ponder over in their leisure hours, and he therefore asked them to agree with him in a hearty vote of thanks to the President for his address.

Mr. Leslie said it was a pleasant duty to have to second this vote, and he was sure they would all give it their heartiest approval, for he looked upon Mr. Flannery as one of the great friends of the institution. As President for the year he had carried out his duties in a first-class manner, as they would say in the engineering world; and he hoped they might look forward to many presidents of his stamp. He believed and hoped they might have presidents who would be in touch with Parliament, so that they might be sure of being represented, and also sure of having engineering matters of vast importance laid before the country in a straightforward way, and he might also say in a mechanical way, because if there were any bearings out of line there was sure to be friction. It would be pleasant to see at the present time that they were getting rid of ships being out of line, and he hoped Mr. Flannery, when he left the chair, would continue to do his best for the marine engineers.

The motion was carried with enthusiasm.

The President, in reply, said:—The best thanks that can possibly be given to any President of this institution lie in the attention and respect with which the members and their ladies listen to the presidential address, and on this point I have had to-night every reason to be proud and well contented. Let me say that the thanks do not lie from the members to the president, but from the president to the members. You have been good enough, by placing me in this position, to put the hall mark on my professional career. I regard my year of office in this institution, of which I have been many years a member, and of which I hope during the rest of my life to continue a member, as the zenith of my professional career. No president can perform his work unless he is amply supported. In this respect the Institute of Marine Engineers has in the honorary secretary, Mr. Adamson, a source of unbounded strength. I often wonder how he finds time to do, as he does, all the work so enthusiastically and so unremittingly for the Institute. Let me, before the formal part of these proceedings terminate, ask you to join with me in a word of thanks informally to Mr. Taylor, the chairman of the recreation committee. To Mr. Taylor, the arrangements for to-night and the whole of the arrangements for the remarkably successful dinner of the Institute last June, are to a very large extent due, and I am sure that the success of these social evenings means largely the success of the institution as a whole; and I am certain that we are only too anxious to give Mr. Taylor the fullest and the warmest thanks for the work which he so thoroughly and so successfully performs. Ladies and gentlemen, during the few months that yet remain of my performance of the duties of my office, I ask you to give me the same support and indulgence that you have hitherto rendered me, so that we may all, by working together, do something towards the continued progress of this institution, whose national importance, I believe, can never be exaggerated.

At the conclusion of the speeches, a short interval was filled with selections on the organ by Mr. H. L. Balfour, while the chairs were removed from the hall for dancing.

THE BLACKMAN VENTILATING FAN.

AMONGST the many modern improvements in passenger and cargo steamers we may note the development of ventilation, for health and comfort in the passenger quarters, and for sanitary and safety purposes as applied to the carrying of cattle, and to the removal of dangerous gases from cargo.

FIG. 1.

The mechanical and positive movement of the atmosphere in confined places to effect the purpose required is now securing large favour from shipowners, and the Blackman Ventilating Co., Limited, are adding, week by week, names of the best passenger and cargo steamers to their list of vessels fitted with the Blackman fan for this purpose.

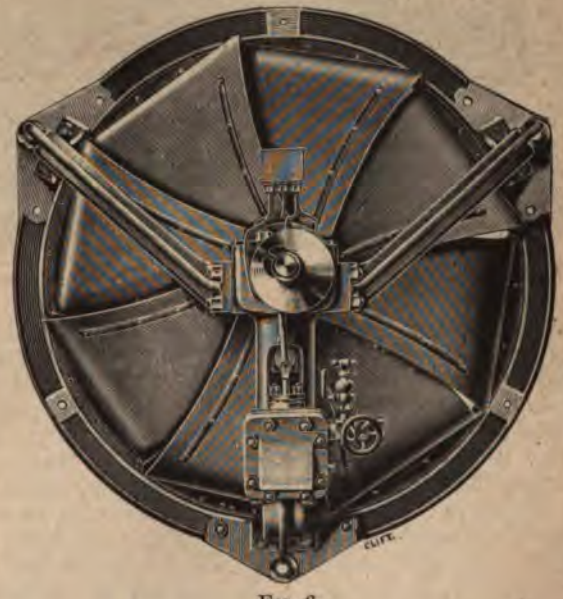


FIG. 2.

The Blackman Ventilating Co. have doubtless secured the enormous and ever-increasing demand for their fans by a close regard, which is their practice, to the general arrangement and disposition of their fans,

and of the ingress to and egress from the fans of the large volume of air or gases that they are peculiarly adapted to set in motion at a small expenditure of power. The company have accurately gauged the powers of their fans when at their best efficiency, that is to say, they aim at dealing with the largest possible volumes at least pressure or intensity; and to gain this end, the adaptation of the fan to the particular requirements of each case, the system of circulation of the air in bulk without restriction, and its immediate and unfettered egress to the open air, are at least as important as the admirable construction and workmanship of the fans themselves and their motors.

We illustrate herewith two designs of Blackman fans and self-contained motors, which are admirably adapted for use on shipboard. Fig. 1 shows the fan driven by an electric motor, which is small and compact, carried on the fan shaft inside the triangular rib frame.

Fig. 2 shows a small high-speed steam engine, similarly fitted direct to the fan spindle, and though the engine is without any remarkable features as to design, it is admirably adapted for its purpose, that of a light, high-speed steam motor, which requires only a steam pipe to be brought to it from any convenient boiler supply.

The value of these self-contained fans and motors lies in the fact that the position of the fan may be determined essentially by the needs of the system of ventilation to be adopted, and not in accordance with the convenience or otherwise of connecting the fan to any established driving power or shaft.

The electrically-driven fans are evidently those most suited for passenger steamers in which dynamos already exist for electric lighting, the current being easily carried to the fans wherever it may be most advantageous to fit the latter for best effect. Where steam can be conveniently applied the steam motor fan will be useful.

The list of steamers using the Blackman fans comprises more than eighty names, including many well-known high-class line steamers and royal yachts.

Among the latter, fitted with 12 electric Blackman fans, is the Russian Imperial yacht *Standart* (see illustration), built by Messrs. Burmeister & Wain, Copenhagen, her dimensions are :—Length, 370 ft.; breadth, 50 ft. 6 in.; depth, 20 ft.; with a displacement of 5,200 tons. The engines are triple-expansion of 10,600 I.H.P. Speed, 20 knots As well as the British Royal yachts, and Messrs. Harland & Wolff, who are usually known as builders who will touch nothing but what is of the best, have applied Blackman fans to eight steamers fitted by them.

The Russian Imperial Yacht "Standart."

With a free thoroughfare for the air current the capacity of these fans is very great, the cubic feet of air moved per minute for the 30-in. fan being from 5,000 to 9,000 ft., with a H.P. required of $\frac{3}{4}$ to $1\frac{1}{4}$; and for the 48-in. fan, 13,500 to 30,000 ft., with a H.P. required respectively of 1 to $2\frac{1}{2}$.

This seems an exceptionally good result, and the Blackman Company claim that it is better than can be had by any other means. They also point out that it is still more important to secure the best ventilating effect.

To induce purchasers to do this, and thus to give the best satisfaction both to themselves and the makers, the latter keep a large staff of trained and experienced experts to advise upon and superintend the carrying out of the fixing of the fans, and the system of ventilation to be adopted, and their services are rendered gratis to the buyers.

The customers in trades other than the Mercantile Marine, such as the textile trades, mill and brewery owners, are numbered by thousands on the lists of the company, and they are sanguine that the merits of their fans and system of ventilation have only to be tested on board ship to enable their adaptations to the Mercantile Marine and the Navy to be as numerous as in other trades.

For forced draught this fan, particularly on the induction system, seems to us to be admirably adapted, and we understand that there are already many installations in land factories, where the fan has been used for forced draught by direct supply to a closed stokehold or ashpit.

THE "KAISER WILHELM DER GROSSE."

WITH this issue of the MARINE ENGINEER we present our readers with a plate of this new steamship. She has the distinction of being, at the moment, the largest vessel afloat, and she may also claim the record for speed on the Atlantic, even if the weather which has prevailed since she came out has not allowed her to lower the record in every detail. She is essentially a German product. She was built at Stettin by the Vulcan Co., which has turned out for the North German Lloyd Co. such vessels as the *Kaiser Wilhelm II.*, the *Havel*, and the *Spree;* and for the Hamburg-American Co. the *Augusta Victoria* and the *Furst Bismarck*. The *Kaiser Wilhelm der Grosse* is, of course, built of steel. She has a straight stem, and an elliptical stern, and has four funnels, placed in two groups of two, and a couple of masts, which are really little more than exaggerated signal poles. The hull is fitted with bilge keels to minimise rolling, and the rudder is entirely under water, so as to render its disablement in action difficult. This last because the construction of the vessel has been undertaken with a view to, as far as possible, make her a useful auxiliary to the German War Navy in time of national stress. The hull is also built in regard to strength, and scantlings in accordance with the requirements of the German Lloyd. The vessel's displacement at load draught is no less than 20,000 tons, which is about 33 per cent. above that of the largest vessel in the British Navy. Her gross tonnage is about 14,000 tons. This is 1,000 tons more than that of the big Cunarders. The ship being 648 ft. in length over all, is 24 ft. longer than the *Campania*. She is 66 ft. beam, and 43 ft. deep from keel to main deck. Her great hull is divided into eighteen portions by sixteen transverse bulkheads, and the longitudinal bulkheads between the two sets of engines. The vessel has a double bottom for her entire length, and her boilers are placed in four separate compartments, so, as far as possible, to ensure that no stranding or collision shall deprive the propelling machinery and pumps of a due supply of steam.

The upper decks have been specially strengthened to carry quick-firing guns The deck uppermost of all is the navigation and boat deck. It extends for nearly 400 ft. amidships, and forms a permanent awning over the passengers' promenade. On this boat deck are carried no less than twenty-four boats. Here, too, are the chart-house, wheel-house, and officers' quarters, so that the navigation staff can carry out their duties without any possible interruption from the crowds of passengers who throng the lower decks. Going down to the promenade deck we find that there is a sheltered walk of 400 ft. in length for the saloon passengers. Forward of this there is a short waist, where the emigrant can take the air on the spar deck, and forward of that a long forecastle, with a couple of breakwaters upon it, and spare stockless anchors. The second-class passengers have the promenade aft on the poop. In the deck-house on the promenade deck are, right forward, the writing-room. Then come a number of very luxurious suites of rooms, and reading and ladies rooms. Aft of these is the smoke-room, a horse-shoe shaped apartment, handsomely decorated in the German style.

The vessel having saloon accommodation for some 400 passengers, in 200 state-rooms, there is naturally a very large saloon, for passengers nowadays object to taking their meals in relays. The difficulty of giving a large saloon without interfering with the bulkheading of the ship is got over by making the saloon amidships as large as the bulkheads will allow, and by making four subsidiary saloons, named respectively the Koningin Luise, the Kaiserin Augusta, the Moltke, and the Bismarck, open out of it. These smaller saloons seat about 30 passengers each, and can be shut off in case of need by watertight doors. The vessel is manned by a crew of 450 men. The captain is aided by a navigating officer as well as by the ordinary mates.

The machinery consists of two sets of triple-expansion engines, balanced on the Schlick system. Each set contains a high-pressure cylinder 52 in. in diameter, an intermediate of 89¾ in., and two low-pressure cylinders of 96½ in. each. The stroke is 69 in. The four cranks are set at angles of 100 deg., 100 deg., 100 deg., and 60 deg. respectively. There are two three-bladed screws, weighing 26 tons each. They are 22 ft. 4 in. in diameter and 32 ft. 8 in. pitch.

There are twelve double-ended boilers in the four groups, and each group has a funnel 12 ft. 2 in. in diameter, rising 106 ft. above the furnace bars. The shafting is of nickel steel, from the Krupp Foundry, and is 198 ft. long and 24 in. in diameter. There are two condensers with a cooling surface of 35,522 square feet. They contain 11,000 tubes, whose total length would amount to something over 30 miles. There is an installation of 16 ventilating fans, for working the vessel under forced draught. The centrifugal and other pumps, capable of being put on the

bilge, are equal to the duty of discharging 3,600 tons of water from the ship per hour. There are four large dynamos for electric lighting, which is, of course, installed all over the ship; and there is also a refrigerating installation. Altogether, with steering apparatus and sanitary pumps, there are no less than 68 separate engines with 124 cylinders, aboard the vessel.

As regards her performance it may be said that on her first voyage she captured the Southampton—New York record—from the *S. Paul*, with a crossing of 5 days, 22 hours, 45 minutes. Her mean speed across was 21·38 knots, and her best day's steaming was 564 nautical miles, which was the best day's run ever made by any vessel. Details of that and of subsequent trips have appeared in the "Fleets of the Mail Lines" as they occurred. But it may be well to give a note on her most recent round trip. On her third outward trip, she left the Needles at 4.30 p.m., on the 10th November, and reached Sandy Hook at 1.20 p.m. on the 16th, making the passage in 6 days, 1 hour, and 3 minutes. The daily runs were—436, 513, 434, 531, 549, 567, and 26 miles. Total distance steamed, 3,055 nautical miles. Mean speed, 21·06 knots. Her best day increased her own record by three miles for a day's steaming, and showed a mean speed for the day of 22·83 knots.

The homeward log is given in full, as it shows the best mean speed ever attained on an eastward voyage by any steamer.

Abstract of Log.

Imperial German and U.S. Mail twin-screw steamship *Kaiser Wilhelm der Grosse*, Captain H. Engelbart.

Passed Sandy Hook Lightship Nov. 23rd 4.47 p.m.
Arrived Needles Lighthouse Nov. 29th, 3.10 p.m., 1897.

Date Nov.	Miles	Lat. N.	Lon. W.	Remarks.
24th	401	41·27	65.12	Overcast; snow squalls; rough sea.
25th	520	44·12	54·2	Cloudy; moderate sea.
26th	513	47.3	42·31	Mostly overcast; moderate sea.
27th	528	49·24	39.48	Cloudy; smooth sea; northerly swell.
28th	525	50·0	16·19	Rain squalls, moderate high W.sea.
29th	507	50·14	3·16	Heavy squalls; very high N.W.sea.
29th	71 to Needles.			Gale from N.W.

Passage—5 days 22 hours 23 min.
Distance, 3,065 miles. Difference in time 4 ,, 50 ,,
Delayed by a burning ship 25 ,,
Time of passage—5 days 17 hours 8 ,,
Average speed, 22·35 knots.

BLYTH NEW GRAVING DOCK.

THIS large new graving dock, constructed to the order of the Blyth Dry Dock Co., Limited, was formally opened at Blyth on Wednesday, November 10th, by Mrs. J. D. Milburn, of Newcastle, and the event was made the occasion of very considerable public display. With a silver knife, suitably engraved, Mrs. Milburn severed the red-white-and-blue riband, which was the signal for the opening of the dock gates, and the admission of the large new steamship *Port Victoria*, owned by Messrs. Milburn & Co. The *Port Victoria* is a vessel of 354 ft. in length, with a beam of 47½ ft., but once she got into the dock it was demonstrable that a considerably larger steamer could easily be accommodated. The dock itself, according to the description officially supplied, is 480 ft. in length, width at cope 89 ft., width at entrance 61 ft., depth of water on sill at high water 22½ ft., and the depth from cope to floor 31 ft. 3 in. The site of the dock is on a piece of ground formerly known as the Flanker, and is situated north of the Blyth Dry Dock Co.'s two docks. After the opening ceremony had been most successfully completed, an adjournment was made to the offices of the company, where luncheon was provided.

Mr. J. D. Milburn, of Newcastle, chairman of the Blyth Dry Dock Co., Limited, in the course of his remarks as chairman, said the opening of that dock was undoubtedly a great event in the history of Blyth. Blyth only twelve or fourteen years ago was considered a small port. The dock which they had that day opened was the fourth largest on the North-East Coast. The steamer which they had seen enter the dock was 5,600 tons deadweight. He could not say anything in higher praise of the dock than to mention that if the steamer had been loaded to her summer freeboard she could have gone into the dock with the greatest of ease, and with a good deal to spare. That improvement meant a great deal to Blyth. Blyth had hitherto had an enormous trade with the Baltic, principally with the smaller steamers, but of late larger steamers between 5,000 and 6,000 tons had been coming there. The steamers which in future would come to Blyth would be steamers of something like 12,000 or 14,000 tons. He believed that the *Milwaukee*, the huge steamer which had recently been built on the Tyne, to the order of the enterprising firm of Messrs. Elder, Dempster & Co, and which carried 11,700 tons, could have been docked in that graving dock with a considerable amount of space to spare. Now they must look not only to Baltic steamers but to the Liverpool firms to send their big steamers there. He believed the Blyth Harbour Commissioners and the North-Eastern Railway Co., would fully appreciate the progress the Blyth Dry Dock Co. had made, and the foresight they had shown in making provision for such huge ships. The fact that there was not only accommodation for such large ships to load cargo, but graving dock accommodation for them, must be a great attraction.

FANS FOR MARINE USES.

AT a meeting of the Institute of Marine Engineers, held on November 8th, a paper was read by the Rev. G. M. Capell on "Centrifugal Fans as applied to Marine Uses." The President of the Institute (Mr. J. Fortescue Flannery, M.P.) occupied the chair.

The President, in introducing the lecturer, referred to the great amount of attention and study which the reverend gentleman had devoted to the scientific improvement of fans, and said now that fans had become more generally applicable in connection with marine engineering than ever before, the subject was one that possessed a very special interest for the members of this Institute.

The Rev. G. M. Capell, in the course of his paper, said that during the last fifteen years very great strides had taken place in the construction of fans in one of their earliest and most important uses, viz., in the ventilation of mines; and side by side with this advance a new, or comparatively new, use for fans sprang up, in the application of fans to forced draught, and more recently to induced draught in marine boilers. The problem set before the mining engineers thirty years ago was to move large volumes of air at water-gauge pressures seldom exceeding 2½ in. The problem was most effectively faced by Monsieur Guibal, in Belgium, who produced, by the combination of a close-fitting case, straight inclined blades, and a long expanding chimney, a fan which could reach about 56 per cent. useful effect, and pass volumes of air reaching 250,000 cubic feet per minute. These fans were very large and costly, but no fan had had a greater application in Europe and America than the Guibal fan until about ten years ago. Another type of fan was much used as a mine ventilator—the Waddle fan—so called from its maker. After referring to the Rittinger and Schiele fans, the author went on to say that in 1886 a new mine ventilator came into use—the Capell fan. This fan differed from all previous fans by having two series of blades, inner and outer, separated by a curved blank piece between the inner wings, dipping into the fan inlet and the outer wings, and having an expanding casing, and a wide hopper-shaped chimney. The first of these fans at Waliswood Colliery, near Rotherham, marked an epoch in mine ventilation. The fan was 10 ft. diameter by 8 ft. wide, and had two inlets 5 ft. 6 in. diameter. At 210 revolutions this fan gave:—Cubic feet per minute, 105,000, water-gauge, 3·25; or 55 per cent. manometric

effect. The useful effect reached 88 per cent. H.P. in the air compared with I.H.P. In 1888 a similar fan at East Howle Colliery, near Ferryhill, 12 ft. diameter by 10 ft., gave:—Revolutions, 200; water-gauge, 3·1 in.; cubic feet per minute, 213,000; and useful effect, 73 per cent. For the purpose of comparison he might state that a Guibal fan 30 ft. diameter, at Staveley, tested by the late Mr. G. Howe, gave:—Diameter of fan, 30 ft.; width, 10 ft.; revolutions per minute, 65; water gauge, 3·65; cubic feet per minute, 101,700; and useful effect, 54·68 per cent. The comparison would show the advance the small quick-running fan had made on the best mine fans in use at that period. Since then the demand for high gauges and large volumes had been continually rising, and Capell fans, giving 240,000 ft. per minute, at 12 in. water-gauge, had been put down, and many giving 8, 9 and 10 in. water-gauge. These fans had been the results of continued improvements on the double-winged fans, notably in 1894 and 1896. It might be objected that the tests referred to related to fans exhausting from mines. This had been the case till recently. It had been well known to engineers who had made fans their study that the fan which would exhaust well, with slight modification would blow well. In America, during the last twelve months, several large mine fans had been placed as blowing fans. One placed on the MacClure Coke Co.'s mine at Lemont, Pa., United States, had proved that the recent patent Capell fans were superior when used as blowing fans than as exhausting fans. This fan was of the following dimensions:—Diameter 12 ft. 6 in., and width 10 ft. It was coupled direct to a high-speed horizontal engine, 17 in. by 18 in. It gave:—Revolutions, 214; cubic feet per minute, 390,650; water-gauge, 4 in.; useful effect, 94 per cent.; and body output per revolution, 148 per cent. In all these tests the fan was direct driven. In the earlier tests of the old patent fans they were rope or belt-driven, causing heavy loss in useful effect. Now, to compare the work of such a fan blowing on a mine with a forced-draught fan they had to compare the work of a similar fan on forced draught. To burn 1 lb. of coal required under forced draught, on an average, 270 cubic feet of air. Then $\frac{390,650}{270}$ = 1,444 lb. of coal burnt per minute. This × 60 = 86,640 lbs. of coal burnt per hour, and putting 2·3 lb. of coal per I.H.P. = 37,680 under 4 in. pressure at the grates. H.M.S. *Majestic* had 10 ft. double-inlet fans (not Capell fans) and four were used. The single 12·6 fan he was describing would have provided air for two such battleships. He merely instanced this to show what could be done with fans of the improved types now in use. The question of high gauges and large volume naturally led to the attempt to reduce the speed of the fan for all pressures, while not reducing the useful effect. It had long been known to engineers conversant with mine fans and blast fans that a fan with blades concave in direction of rotation gave the highest pressure at a given periphery speed, but the useful effect was low, being between 21 and 32 per cent. of the I.H.P., while blades running with their convex face in the direction of the fan's rotation gave a higher useful effect. The writer studied the question, and came to the conclusion that the low useful effect was caused by re-entry of air behind the concave wing, causing a double work of air moving in the fan. To obviate this, he produced the compound outer blade—*i.e.*, a blade consisting of a concave portion running in direction of rotation joined to another convex portion, at a point between the inlet circle and the periphery of the fan. The result was a higher water gauge than had yet been produced at a given periphery speed reaching 110 per cent. of the new rate of Monsieur Daniel Murgue, whose work on Centrifugal Fans was accepted all over the world. There was no doubt that single-acting engines were the best for high speeds, and in working out the best form of fan the question of engine had largely occupied the writer's attention. The conclusion arrived at was that a very simple form of open single-acting engine with long bearings, each 12 in. to 14 in. long, and thoroughly lubricated, a very long crank pin and double-balanced cranks, represented what was required for the continuous work of fan-driving at sea. The question of duplicate engines for the fan was also very important. In mine ventilation, where the fan was, so to speak, the life of the miner, these were largely used, and it seemed just as necessary to provide a duplicate engine to a ship fan, which was the life of the ship's speed under forced draught. Everything points to forced draught or induced draught being the rule in future on marine boilers, especially with the higher pressures on the boilers now coming into use, and the question of the fan and engine would come more and more to the front. The question of useful effect in ship fan was not so unimportant as many supposed. If a fan gave 40 per cent. useful effect the I.H.P. of the engine must be 47·25, while if it gave 70 per cent. useful effect it will be 27 H.P. If simple high-speed engines were used the coal consumption would be at least 6 lbs. of coal per H.P. indicated per hour. In one case 283·5 lbs. of coal were used per hour, in the other case 160 lbs., or per day 3·8 tons, while in the other it would be 1·77 tons—a difference which was worth noting. From this point of view any fan might do, but how would the economy be?

At the conclusion of his paper, Mr. Capell conducted several interesting experiments with an 8-in. model of his fan, and he stated that at the present time over 4,000 fans constructed according to his design were in use for different purposes in various parts of the world. It was with Capell fans that the paddle-steamer *Ozone* broke the record in 1886, when she did 21·4 knots an hour in three hours' steaming. She was fitted with two 5-ft. Capell fans driven at 250 revolutions per minute. A great number of his fans had been fitted in other vessels.

Mr. Sage, who opened the discussion on the paper, observed that if this system of fans was as efficient in exhausting air as in forcing air, there would seem to be a great field for its application in the ventilation of ships, especially war vessels, because he believed it had been found that better ventilation was secured by exhausting the vitiated air in an apartment than by forcing fresh air in. There would also appear to be great scope for the system in connection with refrigerating chambers. The subject was certainly one that concerned them as marine engineers very intimately, for in the near future there would be very few ships without fans on board for some purpose. He was rather surprised, however, when the author told them that the simple high-speed engine involved the large consumption of 6 lbs. of coal per I.H.P. per hour, and afterwards recommended them to use a simple high-speed engine for these fans.

Mr. J. T. Smith asked the author whether fans of this description were applicable by themselves for the ventilation of mines say from 3,000 to 5,000 ft. deep. The author had mentioned that he got a water pressure of from 8 to 12 in. Such a pressure as that was not likely to be used in forced draught, because it would very likely take all the coal off the bars.

Mr. Joy questioned if a water pressure of 8 in. or 12 in. would have the effect suggested by the previous speaker. In locomotives the pressure was very nearly equal to 8 in., but it did not blow all the coal off the bars. The recommendation of Mr. Capell that there should be duplicate engines for driving fans was rather a retrograde movement. Engineers were now giving up duplicate engines for centrifugal pumps, and why should they require duplicate machinery for centrifugal fans?

Mr. Johnston inquired how the work done by the Capell fans compared with that done by other fans generally used on board ships.

Mr. Capell, in reply, referred to a 7-ft. 6-in. fan now running, and making 350 revolutions, and said that a fan of the same size running under the conditions of his system would give the same result at 265 revolutions per minute. In other words, his fan would give the same kind of result with a third less motion. They knocked off nearly 100 revolutions per minute, and got the same result.

LAUNCHED IN DENMARK IN 1897.

By Burmeister & Wain, Copenhagen.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
* Nadeshnij	Steel	Steam	Foreign	1,212	2,500
† Livonia	,,	,,	Danish	2,108	900
† Kentucky	,,	,,	,,	3,648	1,200
† Arkansas	,,	,,	,,	3,648	1,200
By Elsinore Iron Shipbuilding and Engineering Co., Elsinore.					
† Skanderborg ..	Steel	Steam	Danish	1,890	800
† Dr. Hans Jurg Kiœr	,,	,,	Foreign	1,136	520
* Kattegat	,,	,,	Danish	127	130
† Venus	,,	,,	Foreign	625	300
† Herakles	,,	,,	,,	698	1,100
† Bore	,,	,,	,,	702	900
† Nr. 70	,,	,,	Danish	350	800

LIST OF VESSELS LAUNCHED IN 1897.

ENGLISH.

By Robt. Thompson & Sons, Sunderland.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis	H.P. N.
† Drumgarth	Steel	Steam	British	3,654	318
† Bascuta	,,	,,	,,	2,875	236
† Brantingham ..	,,	,,	,,	2,616	250
† Almerian	,,	,,	,,	2,983	285
† No. 196	,,	,,	,,	3,110	287
* Lewis	,,	,,	,,	196	33

By Rowden & Son, Stockton-on-Tees.

† Dunblane	Steel	Steam	British	3,746	300
† Ashfield	,,	,,	,,	2,320	210
† Windsor	,,	,,	,,	4,074	300
† Llandudno ..	,,	,,	,,	4,064	300
† Coningsby	,,	,,	,,	3,356	250
† Queenswood ..	,,	,,	,,	2,701	190
† Aldershot	,,	,,	,,	2,177	160
Hopper Barge ..	Iron	—	,,	140	—

By S. P. Austin & Son, Ltd., Wear Dockyard, Sunderland.

† Harlech	Steel	Steam	British	1,282	130
† Harmonic	,,	,,	,,	2,876	210
† Harmony	,,	,,	,,	1,118	130
† Perth	,,	,,	,,	1,799	150

By Richardson, Duck & Co., South Stockton Iron Shipyard, Thornaby-on-Tees.

Claudia	Steel	Steam	British	1,144	299
Oakmore	,,	,,	,,	4,547	447
Foylemore ..	,,	,,	,,	3,153	303
Lady Lewis ..	,,	,,	,,	2,949	246
Chwerstone ..	,,	,,	,,	2,946	246
2 Barges	,,	—	—	300	—

By Strand Slipway Co., Sunderland.

† Hylton	Steel	Steam	British	1,484	159

By Joseph L. Thompson & Sons, Ltd., North Sands Shipbuilding Yard, Sunderland.

Amphitrite ..	Steel	Steam	Foreign	2,734	220
Moravia	,,	,,	,,	3,502	300
Ovidia	,,	,,	,,	2,988	270
Tai-Nan	,,	,,	,,	3,192	600
Indianic	,,	,,	British	2,837	300
Min	,,	,,	,,	3,083	300
Port Victoria ..	,,	,,	,,	3,378	400
Croydon	,,	,,	,,	3,784	290
Luciana	,,	,,	Foreign	4,842	400
Green Jacket ..	,,	,,	British	2,836	220

By James Laing, Deptford Yard Sunderland.

Rex	Steel	Steam	—	1,231	400
Ile de la Réunion	,,	,,	—	3,709	300
Tai-Chu	,,	,,	—	3,211	600
Orissa	,,	,,	—	5,435	450
Sultan van Langkat	,,	,,	—	2,350	300

By Thomas Turnbull & Son, Whitehall Dockyard, Whitby.

† Trongate ..	Steel	Steam	British	2,552	236

By Short Brothers, Sunderland.

Thornhill	Steel	Steam	British	3,231	300
T. R. Thompson ..	,,	,,	,,	3,538	300
King Frederick ..	,,	,,	,,	2,577	200
George Fleming ..	,,	,,	,,	3,448	300
Spartan Prince ..	,,	,,	,,	3,298	350
Citta di Palermo ..	,,	,,	Foreign	3,026	317
South Africa ..	,,	,,	British	3,424	332
Chantenay ..	,,	,,	Foreign	1,740	160
Venetia	,,	,,	British	3,463	328
Maygrove	,,	,,	,,	2,815	240

* Compound. † Triple.

By Allsup & Co., Ltd., Caledonian Foundry, Strand Road, Preston.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
* Vigilant	Wood	Steam	British	15	20
Olive	Steel	Sail	,,	30	—

By Blyth Shipbuilding Co., Limited, Blyth.

† Dauntless	Steel	Steam	British	2,156	1,045
† Craigneuk ..	,,	,,	,,	3,027	1,150

By Cox & Co., Dock Iron Works, Falmouth.

* Conqueror ..	Steel	Steam	British	112	480
* Penguin	,,	,,	,,	96	326
* James Searle ..	Composite	,,	,,	69	302
* Hotspur	Steel	,,	,,	20	65
Barge for Africa	,,	Sail	,,	95	—

By R. Craggs & Sons, Middlesbro.

* Roussillon ..	Steel	Steam	Foreign	337	350
† Portugalete ..	,,	,,	,,	2,026	950
† Aulne	,,	,,	,,	1,030	750
† Mermaid	,,	,,	British	293	520
† Hummersea ..	,,	,,	,,	539	450
† Suomi	,,	,,	Foreign	646	475
† Homewood ..	,,	,,	British	2,026	950
† Harperley ..	,,	,,	,,	2,432	1,200

By Craig, Taylor & Co., Thornaby-on-Tees.

† Admiral Ihlen ..	Steel	Steam	Foreign	2,074	800
† Whitehall	,,	,,	British	2,068	800
† Wreathier	,,	,,	,,	855	800
† Puritan	,,	,,	,,	4,042	1,600
† Dunrobin	,,	,,	,,	2,808	1,200

By William Dobson & Co., Low Walker, Newcastle-on-Tyne.

† Kadina	Steel	Steam	Foreign	2,710	1,675
* Jupiter	,,	,,	,,	1,435	1,350
* Ashot Erkat ..	,,	,,	,,	1,053	950
* Ignatief	,,	,,	,,	1,052	900
† Willyama	,,	,,	,,	2,705	1,675
† Alpha	,,	,,	,,	272	400
† Beta	,,	,,	,,	272	400
† Gamma	,,	,,	,,	272	400
† Delta	,,	,,	,,	272	400
† Epsilon	,,	,,	,,	273	400
† Zeta	,,	,,	,,	273	400
† Eta	,,	,,	,,	273	400

By Thomas Downie & Co., Toxteth Engine and Shipbuilding Works, Caryl Street, Liverpool.

* Alert	Wood	Steam	British	—	100

By Earle's Shipbuilding & Engineering Co., Ltd., Hull.

† Perseus	Steel	Steam	British	2,135	7,000
† Caledonia	,,	,,	,,	192	410
† Prince Edward ..	,,	,,	,,	1,414	3,200
† Victory	,,	,,	,,	160	350
† Trafalgar	,,	,,	,,	160	350
† 4 Vessels	,,	,,	,,	180ea	475ea
ALSO MACHINERY FOR					
† Furious	—	—	,,	—	10,000
† Jacinth	—	—	,,	—	400
† Sabrina	—	—	,,	—	410
† Betzy	—	—	Foreign	—	400
† Congo	—	—	British	—	360
† Douro	—	—	,,	—	360
† Dane	—	—	,,	—	350
† Dovey	—	—	,,	—	350

By Elliott & Jeffery, West Docks, Cardiff.

* Lady Lewis ..	Iron & Stl.	Steam	British	154	450

By G. Napier & Son, Cross House Engineering Works, Southampton.

* William Arnold ..	Steel	Steam	British	40	75
* Pioneer	,,	,,	,,	45	75
* Record	,,	,,	,,	65	75

* Compound. † Triple.

By Osbourne, Graham & Co., Hylton, Sunderland.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Rustington ..	Steel	Steam	British	2,185	190

By Wm. Pickersgill & Sons, Southwick, Sunderland.

† Heronspool ..	Steel	Steam	British	2,692	1,000
† Middleham Castle	,,	,,	,,	3,061	1,000

By A. W. Robertson & Co., Lea Shipbuilding Yard, Canning Town, E.

* Souvenir	Yacht steel	Steam	British	80	230
* Thames	Steel tug	,,	,,	32	120
12 Lighters ..	Steel	—	,,	1,120	—
36 Lighters ..	Iron	—	,,	4,340	—

By Union Co-operative Shipbuilding Co., Blyth.

* Rover	Wood	Steam	British	81	32

By R. Williamson & Son, Workington, Cumberland.

Carmanian ..	Steel	Sail	British	1,867	—
* Nith	,,	Steam	,,	285	380
* No. 111	,,	,,	,,	400	430
7 Barges (towing)	—	—	,,	900	—

By J. G. Fay & Co., Ltd., Southampton.

May Morn (cruiser)	Wood	Sail	British	30	y.m.
Eileen ,,	,,	,,	,,	20	y.m.
Aurora (racer) ..	Composite	,,	,,	175	t.m.
Enid (rater) ..	Wood	,,	,,	—	—

By Wm. Harkess & Son, East Slipway, Middlesbro'.

Ner, No. 3 ..	Iron	Sail	British	200	—
Ner, No. 4 ..	,,	,,	,,	200	—

By Ritson & Co., Maryport.

Acamas	Steel	Sail	British	1,860	—

By Bartram & Sons, South Dock, Sunderland.

† Queen Mary ..	Steel	Steam	British	3,564	1,739
† Hemisphere ..	,,	,,	,,	3,485	1,528
† Kirklee	,,	,,	,,	3,579	1,624

By H. Fellow & Son, Yarmouth.

* Norman	Steel	Steam	British	32	—
No. 155	,,	Sail wher'y	,,	28	—

By W. H. Lean, Falmouth.

Victoria	Steel	Sail	British	165	—

By R. & W. Hawthorn, Leslie & Co., Ltd., St. Peter's Works, Newcastle-on-Tyne.

H.M.S. Cheerful ..	Engines not by builders.	Steam	British	298	6,000
Polius		,,	Foreign	976	800
Equator		,,	,,	966	800
Tropic		,,	,,	968	800
Meridian		,,	,,	967	800
Siberiak		,,	,,	98	250
8 vessels (350 to 357)		,,	,,	272ea	400ea
MACHINERY ONLY.				—	
H.M.S. Andromeda	—	,,	British	—	16,500
,, Mermaid ..	—	,,	,,	—	6,000
Warship	Boilers only.	,,	Foreign	—	4,500
,, ...		,,	,,	—	6,500
Merchant vessel ..		,,	,,	—	3,500

By Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees.

Raven	Steel	Steam	British	131	300
Tai Hoku ..	,,	,,	Foreign	3,179	3,600
Russ	,,	,,	,,	2,463	1,000
Deusto	,,	,,	,,	1,634	600
Montrose	,,	,,	British	5,431	3,500
Mediana	,,	,,	,,	2,463	1,000
Sallust	,,	,,	,,	3,590	2,750
Bruxellesville ..	,,	,,	Foreign	3,850	2,500
Plencia	,,	,,	,,	2,423	1,100
Arminza	,,	,,	,,	2,423	1,100
Gambia	,,	,,	British	2,833	1,250

* Compound. † Triple.

By Vickers, Sons & Maxim, Ltd., Naval Construction Works, Barrow-in-Furness.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
H.M.S. Niobe ..	Steel	Steam	British	11,000	18,000
H.M.S. Leopard ..	,,	,,	,,	800	6,400
Duchess of Devonshire	,,	,,	,,	1,265	5,200
Roebuck	,,	,,	,,	1,281	6,300
Reindeer	,,	,,	,,	1,281	6,300
Joseph Thompson	,,	,,	,,	995	1,100
Clan Sinclair ..	,,	,,	,,	—	2,500

By John Blumer & Co., North Dock, Sunderland.

† Arranmoor ..	Steel	Steam	British	2,452	230
† City of York ..	,,	,,	,,	3,100	240
† Carisbrook ..	,,	,,	,,	2,151	200
† Stilbo	,,	,,	Foreign	3,165	260

By Sunderland Shipbuilding Co., Sunderland.

† Uranus	Steel	Steam	Foreign	989	700
† Kronos	,,	,,	,,	924	550
† Briton	,,	,,	British	790	800
† Russie	,,	,,	Foreign	1956	4,000

By Laird Brothers, Birkenhead.

Panther	Steel	Steam	British	320	6,000
Seal	,,	,,	,,	320	6,000
Wolf	,,	,,	,,	320	6,000
Fulton	,,	,,	Foreign	100	150
Lighter	,,	,,	,,	55	—
Connaught ..	,,	,,	British	3,070	9,000
Presidenté Sarmien to	,,	,,	Foreign	2,352	2,000
Princesse Alice ..	,,	,,	,,	1,270	1,000
H.M.S. Express ..	,,	,,	British	400	10,000

By Palmer's Shipbuilding and Iron Co., Ltd., Jarrow-on-Tyne.

H.M.S. Flying Fish	Steel	Steam	British	355	6,000
H.M.S. Fawn ..	,,	,,	,,	355	6,000
H.M.S. Flirt ..	,,	,,	,,	355	6,000
H.M.S. Pegasus ..	,,	,,	,,	2,150	7,000
H.M.S. Pyramus ..	,,	,,	,,	2,150	7,000
Oriel	,,	,,	,,	3,544	1,500
Penguin	,,	,,	Foreign	208	455
Montcalm ..	,,	,,	British	7,058	3,500
Adana	,,	,,	,,	3,708	2,000
Trentham Hall ..	,,	,,	,,	4,349	2,000
Asama	,,	,,	,,	4,534	2,000
Monterey	,,	,,	,,	7,058	3,500
Nordfarer ..	,,	,,	Foreign	4,495	1,680

By Edwards & Co., Millwall.

Harley	Steel	Steam	Foreign	45	120
Helena	,,	,,	,,	45	120
No. 390, Barge ..	,,	—	,,	32	—
,, 391, Steam B'g	,,	Steam	British	10	—
,, 392, Launch ..	,,	,,	Foreign	3	8
Salta	,,	,,	,,	24	90
Posadas	,,	,,	,,	30	140
No. 396, Pontoon	Iron	—	British	75	—
,, 397, ,,	,,	—	,,	100	—
,, 399 and 400, 2 Launches	Steel	Steam	Foreign	30ea	80ea
Dorotea	,,	,,	,,	100	75
No. 402, Pontoon	,,	—	,,	70	—
,, 403, Water Barge	,,	—	,,	12	—

By Simpson, Strickland & Co., Ltd., Dartmouth.

* 2 Admiralty Pinnaces	Wood	Steam	British	—	ea200
a Light draft Twin-screw Launch ..	Steel	,,	Foreign	—	66
* Stephanus ..	Wood	,,	British	—	50
* Stern wheel Launch	Steel	,,	Foreign	—	15
† Small Yacht ..	Wood	,,	British	—	65
* Light draft tug ..	Steel	,,	—	—	20
Lifeboat	Wood	Sail	British	—	

And 28 launches in Steel and Wood.

* Compound. † Triple. a Quadruple.

By Wm. White & Sons, West Cowes, Isle of Wight.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Zaneta	Composite	Steam	British	114	208
* Maia	,,	,,	,,	42	100
† Steam Yacht ..	Wood	,,	,,	10	30
* 6 Admiralty Cutters	,,	,,	,,	—	90
* 4 Admiralty Cutters	,,	,,	,,	—	100
* Pilot Boat ..	,,	,,	Foreign	15	40

By Vosper & Co., Portsmouth.

* Laura	Wood	Steam	British	27	75
Aorangi	,,	Oil	,,	9	16
Frances	,,	,,	,,	7	9
Constance ..	,,	,,	,,	5	6
No Name	,,	,,	,,	2	4
* 3 Admiralty Cutters	,,	Steam	,,	8ea	23ea

By G. Rennie & Co., Thames Street, Greenwich.

Gwendolen ..	Steel	Steam	Foreign	350	400
Arctic	,,	Sail	British	140	
2 Lighters ..	,,	—	,,	250ea	
6 ,, ..	,,	—	,,	220ea	
6 ,, ..	,,	—	,,	200ea	
2 ,, ..	,,	—	,,	190ea	
3 ,, ..	,,	—	,,	170ea	
19 ,, ..	,,	—	,,	140ea	
1 ,, ..	,,	—	,,	120	
5 ,, ..	,,	—	,,	80ea	
1 ,, ..	,,	—	,,	250	

Tons displacement

By Forrestt & Son, Ltd., Wyvenhoe, Essex.

* 4 Vedette Boats ..	Wood	Steam	British	15ea	200ea
* Sir Richard Mayne	,,	,,	,,	32	200
* 1 Yacht	Steel	,,	Foreign	32	90
* 1 Launch	,,	,,	,,	35	80
* 1 ,, ...	Wood	,,	British	42	100

Besides 7 Barges, 11 Whaleboats, and 65 other Boats for British and Foreign Owners.

By Furness, Withy & Co., Ltd., West Hartlepool.

† Annie	Steel	Steam	British	3,743	—
† Maylands	,,	,,	,,	2,517	—
† Victoria	,,	,,	,,	7,000	—
† Assyrian	,,	,,	,,	2,975	—

By Camper & Nicholson, Gosport.

Iota	Wood	Sail	British	—	—
Minnielaha ..	,,	,,	,,	—	—
* Highwayman ..	,,	Steam	,,	—	—

And several Racing Boats.

By Sidney J. Dewdney, Brixham.

Devonia	Wood	Sail	British	48	—
Maude	,,	,,	,,	47	—
Bee	,,	,,	,,	11	—
Delight	,,	,,	,,	47	—
Reindeer	,,	,,	,,	50	—

By Henry Scarr, Haven Shipyard, Hessle.

3 Vessels	Iron & St'l	Sail	British	115	nett tonnage
2 ,, ...	,,	,,	,,	125	
2 ,, ...	,,	,,	,,	140	
Kingston	,,	,,	,,	220	

By A. Rutherford & Co. Neptune Works, Birkenhead.

Mildred Ollivant ..	Wood	Sail	British	40	—
No. 999 Lighter ..	,,	—	,,	—	—
,, 1013 ,, ..	,,	—	Foreign	—	—

Besides 13 Lifeboats, 17 Cutters, 2 Pinnaces, 11 Gigs, 14 Dinghys, 5 Surfboats, 1 Chute Boat, and 4 Balsa Life Rafts for British and Foreign owners.

By R. & H. Green, Blackwall.

3 Hopper Barges ..	Steel	—	British	200	To carry
1 Coal ,, ..	,,	—	,,	100	
2 ,, ,, ..	,,	—	,,	200	
1 ,, ,, ..	,,	—	,,	300	
6 Lighters ,, ..	,,	—	,,	90	

* Compound. † Triple.

By Sir W. G. Armstrong, Whitworth & Co., Ltd., Walker Shipyard, Newcastle-on-Tyne.

Name of Vessel.	Built of	Class	Owners.	F. T. Regis.	H.P. I.
Harald Haarfagre	Steel	Steam	Foreign	3,500	4,500
Tordenskjold ..	,,	,,	,,	3,500	4,500
O'Higgins ..	,,	,,	,,	8,500	16,000
Samarkand ..	,,	,,	,,	975	850
Mechti	,,	,,	,,	789	750
Takasago	,,	,,	,,	4,160	14,750
Rasoul	,,	,,	,,	997	850
Nedjof	,,	,,	,,	481	300
Useinia Manafoff	,,	,,	,,	1,040	850
Hai Tien	,,	,,	,,	4,500	17,000
Audrey	,,	,,	British	203	500
Aileen	,,	,,	,,	204	500
Barge	,,	—	Foreign	390	—

By Charles Hansen & Sons, West Cowes, Isle of Wight.

Betty	St'l & W'd	Sail	British	56	—

By Wm. Doxford & Sons, Ltd., Sunderland.

† Clan Macdonald	Steel	Steam	British	4,839	2,800
† Clan Murray ..	,,	,,	,,	4,830	2,800
† Clan Monroe ..	,,	,,	,,	4,853	2,800
† Clan Robertson ..	,,	,,	,,	4,826	2,800
† Titania	,,	,,	,,	3,672	1,500
† Pearlmoor ..	,,	,,	,,	3,480	1,500
† Caithness	,,	,,	,,	3,490	1,500
† H.M.S. Violet ..	Torpedo boat		,,	342	6,000
† H.M.S. Sylvia ..	destroyers.		,,	342	6,000

By Wm. Gray & Co., Ltd., West Hartlepool.

† Vlug	Steel	Steam	Foreign	1,307	800
† Olaf	,,	,,	,,	1,894	1,100
† Afghanistan ..	,,	,,	British	2,753	1,300
† Britannic ..	,,	,,	,,	3,076	1,500
† Pendennis ..	,,	,,	,,	2,123	1,200
† Helga	,,	,,	Foreign	1,188	800
† Martha	,,	,,	,,	1,188	800
† Eveline	,,	,,	British	2,605	1,300
† Arlington ..	,,	,,	,,	3,092	1,500
† Ambassador ..	,,	,,	,,	2,574	1,300
† Sturton	,,	,,	,,	2,128	1,200
† Sceptre	,,	,,	,,	2,578	1,300
† Atlas	,,	,,	,,	3,089	1,500
† Olivemoor ..	,,	,,	,,	3,069	1,500
† Pallas	,,	,,	Foreign	2,008	900
† Saint Helen ..	,,	,,	British	2,598	1,300
† Alpha	,,	,,	Foreign	2,008	900
† Cresyl	,,	,,	British	2,342	1,250
† Harlingen	,,	,,	,,	3,080	1,700
† Koordistan ..	,,	,,	,,	2,753	1,300

By Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne.

† Fitzclarence ..	Steel	Steam	British	4,034	2,000
† Port Albert ..	,,	,,	,,	3,514	1,800
† Port Phillip ..	,,	,,	,,	3,103	1,700
† Trojan	,,	,,	,,	3,669	2,250
† Tremont	,,	,,	,,	3,700	2,250

By Wigham Richardson & Co., Neptune Works, Newcastle-on-Tyne.

Takao	Steel	Steam	—	1,609	1,300
Avon	,,	,,	—	1,722	5,600
Sakkarah	,,	,,	—	4,660	1,950
Albina	,,	,,	—	242	290
Ariadne	,,	,,	—	1,981	1,500
Van Swoll	,,	,,	—	1,625	1,350
Van der Lijn ..	,,	,,	—	978	710
Tannenfels ..	,,	,,	—	5,400	2,500

By J. Priestman & Co., Southwick, Sunderland.

† Rugby	Steel	Steam	British	3,286	1,500
† Ursula Brigl t ..	,,	,,	,,	3,295	1,500
† Uller	,,	,,	Foreign	1,860	1,200
† Wiltshire	,,	,,	British	2,095	1,150
† Enfield	,,	,,	,,	2,124	1,100

† Triple.

By Willoughby Bros., Ltd., Plymouth.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
* Sleuthhound ..	Steel	Steam	British	48	200
* Privateer	,,	,,	,,	125	360

By Cochrane & Cooper, Beverley.

Magnolia	Iron	Steam	British	193	420
Victor	,,	,,	,,	193	320
Verbena	,,	,,	,,	158	270
Laurel	,,	,,	,,	137	240
Sea King & Ulster	,,	,,	,,	185ea	320ea
Albatross	,,	,,	,,	157	270
Malta	,,	,,	,,	137	240
Cormorant ..	,,	,,	,,	162	270
3 Vessels	,,	,,	—	185ea	420ea
Doris	,,	,,	British	174	420
Etruria	,,	,,	,,	183	420
Rialto	,,	,,	,,	139	240
Umbria	,,	,,	,,	183	420
Gold Finder ..	,,	,,	,,	158	270
Pinewold	,,	,,	,,	150	240
3 Vessels	,,	,,	,,	188ea	320ea
La Canche ..	,,	,,	Foreign	150	300
Pecheries Ostendaises IV. ..	,,	,,	,,	156	300

By Cook, Welton & Gemmell, South Bridge Road, Hull.

† Sabrina	Iron	Steam	British	158	420
† Lord Nelson ..	,,	,,	,,	161	320
† Douro & Congo ..	,,	,,	,,	151ea	360ea
† Scotland & Ireland	,,	,,	,,	151ea	200ea
† Sargon	,,	,,	,,	167	320
† Solon	,,	,,	,,	158	280
† 2 vessels	,,	,,	,,	172ea	370ea
† 2 ,, ...	,,	,,	,,	181ea	370ea
† Faraday	,,	,,	,,	176	390
† 2 vessels	,,	,,	,,	181	370
2 ,, ...	,,	,,	,,	160	—
2 ,, ...	,,	,,	,,	151	200

By Edwards Bros., North Shields.

2 Trawlers ..	—	Steam	British	134ea	300ea
6 ,, ..	—	,,	,,	145ea	320ea
11 ,, ..	—	,,	,,	142ea	320ea
Liolia	—	,,	Foreign	568	400
Empress	—	,,	British	67	200
2 vessels	—	,,	,,	242ea	550ea
Swift	—	,,	,,	240	550
Martin	—	,,	,,	241	550
Carroo	—	,,	,,	201	140
2 vessels	—	,,	,,	317ea	280ea
2 trawlers	—	,,	,,	132ea	270ea
Marian	—	,,	,,	148	350
2vessels	—	,,	,,	160ea	360ea
2 ,, ...	—	,,	,,	140ea	300ea

By Joseph Scarr, Beverley.

No. 97, Lighter ..	Steel	—	British	250	—
,, 98 ,, ..	,,	—	,,	320	—
,, 99 ,, ..	,,	—	,,	100	—
* Newport	Iron	Steam	,,	120	40
2 Boats	,,	Sail	,,	125ea	—
4 Lighters ..	,,	—	,,	180ea	—
Dauntless	Steel	—	,,	225	—
2 Twin Barges ..	,,	Barge	,,	230ea	—
John Exley ..	,,	—	,,	110	—

By J. P. Rennoldson & Sons, South Shields.

Petrel	Iron	Steam	British	169	420
† Maretanza ..	Steel	,,	,,	195	600
Clara	,,	Sail	,,	300	—
Dora	,,	,,	,,	300	—
† Prince Ferdinand-de-Roumanie ..	,,	Steam	Foreign	85	300
* Rhona	,,	,,	British	142	440
* Cyclop	,,	,,	Foreign	177	475
Nedjef (engined only)	—	—	—	—	324

* Compound. † Triple.

By J. T. Eltringham & Co., Stone Quay, South Shields.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
Rover	Iron	Steam	British	151	500
* Ben Lomond ..	Steel	,,	,,	124	270
* Ben Nevis ..	,,	,,	,,	124	270
* Diamond	,,	,,	,,	36	60
* Jubilee	,,	,,	,,	36	60
† Duchess	,,	,,	,,	158	280
* Trawler Prince ..	,,	,,	,,	126	285
* Victorian Prince ..	,,	,,	,,	126	285
† Marie Stephanie ..	,,	,,	Foreign	184	360

By John Readhead & Sons, West Docks, South Shields.

Kirriemoor ..	—	—	—	3,291	1,500
Trevilley	—	—	—	3,112	1,500
Northville ..	—	—	—	2,472	1,350
Ville de Valenciennes	—	—	—	1,819	1,350
Alnmere	—	—	—	3,252	1,500
Afonwen	—	—	—	3,324	1,500
Fridtjof Nansen ..	—	—	—	3,277	1,500
Trelyon	—	—	—	3,112	1,500

By C. S. Swan & Hunter, Ltd., Wallsend-on-Tyne.

† Sorata	Steel	Steam	British	4,581	2,800
† Ashanti	,,	,,	,,	3,389	1,800
† Manoussis ..	,,	,,	Foreign	2,115	1,200
† Metis	,,	,,	British	3,386	1,800
† Ethelhilda ..	,,	,,	,,	2,902	1,700
† Monarch	,,	,,	,,	7,296	3,500
Havana Dock ..	,,	—	Foreign	8,550	—
† Saint Leonards ..	,,	Steam	British	4,281	2,200
† Idaho	,,	,,	,,	5,850	6,000
† Reresby	,,	,,	,,	2,850	1,800
† Lokoja	,,	,,	,,	3,370	1,800

By Wood, Skinner & Co., Bill Quay, Newcastle-on-Tyne.

* St. Hilda	Steel	Steam	British	104	275
† Hermod	,,	,,	Foreign	1,390	950
† Helios	,,	,,	,,	1,395	950
† Crest	,,	,,	British	2,854	1,280
† Paris	,,	,,	,,	1,100	1,200
* Elswick	,,	,,	,,	180	265
* St. Mary	,,	,,	,,	103	275

By Cottingham Bros., Goole.

John and Annie ..	Wood	Sail	British	120*b*	—
William	,,	,,	,,	100*b*	—
Daybreak	,,	,,	,,	120*b*	—

b Tons deadweight.

By Geo. & Thos. Smith, Rye, Sussex.

R.H.B.	Wood	Sail	British	36	—
Vulcan	,,	,,	,,	37	—
Mercia	,,	,,	,,	29	—
Leonora	,,	,,	,,	37	—
Gull	,,	,,	,,	30	—

By John Jones & Sons, Brunswick Dock, Liverpool.

* Ruby	Steel	Steam	British	170	500
Pearl	,,	,,	,,	170	500
Guajara	,,	Sail	Foreign	200	—
Magnary	,,	,,	,,	160	—
Camapijo	,,	,,	,,	80	—
* L'Union	,,	Steam	,,	100	300

By Edwin Clark & Co., Brimscombe, Stroud, Glos.

* Kenia	Steel	Steam	Foreign	10	24
No. 246	,,	,,	,,	12	—
No. 226	,,	,,	British	4	—

By Yarrow & Co., Ltd., Poplar.

Two shallow-draft twin-screw steamers, 145 ft. by 24 ft. 6 in. beam; built in floatable sections; fitted with Yarrow's patent water-tube boilers; draft, 2 ft.; speed, 12 miles. English Government.

Six shallow-draft twin-screw steamers, 100 ft. by 20 ft.; built

* Compound. † Triple.

in floatable sections; fitted with Yarrow's patent water-tube boilers; speed, 9 knots; draft, 2 ft. English Government.

Two steam launches, 58 ft. by 8 ft. Home Service.

Two Yarrow's patent water-tube boilers for a steam yacht. Home Service.

Six Yarrow's patent water-tube boilers for three torpedo boats. Foreign Service.

Four torpedo-boat destroyers, 220 ft. long by 20 ft. 6 in. beam; 31 knots. Foreign Service.

Four first-class torpedo-boats, 152 ft. 6 in. long by 15 ft. 3 in. beam; speed, 24 knots. Foreign Service.

Three Yarrow's patent water-tube boilers for torpedo boats. Foreign Service.

Four Yarrow's patent water-tube boilers for torpedo boats. English Government.

Six first-class steel torpedo boats, 152 ft. 6 in. long and 15 ft. 3 in. beam; fitted with triple-expansion engines and Yarrow's patent water-tube boilers; speed, 25½ knots. Foreign Service.

One second-class torpedo boat (steel) 60 ft. long by 9 ft. 3 in. beam; speed, 20 knots. Foreign Service.

One shallow draft steel steamer, 55 ft. long by 11 ft. beam; draft, 9 in.; speed, 8 miles. Foreign Service.

Two shallow-draft steel steamers, 150 ft. long by 31 ft. beam; draft, 3 ft.; speed, 12 miles. Foreign Service.

One shallow-draft steel launch, 70 ft. long by 10 ft. beam. Foreign Service.

Vessels engined by Wm. Allen & Co., Ltd., Scotia Engine Works, Sunderland.

Name of Vessel.	H.P.N.
Thornhill	310
Annie	300
Universal	Boiler
Wiltshire	220
Puritan	330
South Africa	335
Enfield	210
Chantenay	160
Harperley	240

Total Indicated horse power, about 11,000.

Central Marine Engine Works, West Hartlepool. Output for the year 1897.

Name of Vessel.	Port of Registry.	I.H.P.
1 Manoussis	Andros	1,100
2 Rex	Stockholm	1,800
3 Vlug	Amsterdam	800
4 Olaf	Copenhagen	1,100
5 Afghanistan	Swansea	1,300
6 & 11 Britannic & Arlington	Hull	1,500ea
7 Pendennis	Truro	1,200
8 & 9 Helga & Martha	Copenhagen	800ea
10, 12, & 14 Eveline, Ambassador, and Sceptre	Newcastle-on-Tyne	1,300ea
13 Sturton	Hull	1,200
15 Atlas	West Hartlepool	1,500
16 Olivemoor	Newcastle-on-Tyne	1,500
17 Pallas	Flensburg	900
18 & 21 Saint Helen and Koordistan	London	1,300ea
19 Alpha	Amsterdam	900
20 Cresyl	Hull	1,250
22 Harlingen	London	1,700
	Total	27,350

Machinery built by John Stewart & Co., Ltd., Blackwall.

New boilers for General Steam Navigation Co.'s "Kern," W. Watkin's "Columbia," War Office, Sir Francis Head; Canal Dock Yard. New engines for Canal Dock Yard. New machinery for Thames Police, Sir Richard Mayne. Tripled engines of Agnes (887 tons), and two new boilers.

List of vessels engined by George Clark, Ltd., Sunderland.

Rustington, Ile de la Réunion, Harmonic, Heronspool, Carisbrook, Orissa, Drumgarth, George Fleming, 196, Russ, Brantingham, Citta di Palermo, Sultan van Langkat, Middleham Castle, Almerian, Luciana. Total, 16 engines. N.H.P., 4,606. I.H.P., 27,600.

Marine engines built by Blair & Co., Ltd., Stockton-on-Tees.

Name of vessel.	I.H.P.
Spartan Prince	2,100
Oakmore	2,000
Rugby and Ursula Bright	1,500ea
Dunblane, City of York, Windsor, Foylemore, Llandudno and Craigneuk	1,400ea
Amphitrite	1,350
Coningsby	1,300
Erandio, Lady Lewis and Chiverstone	1,200ea
Carville, Ashfield, King Frederick, Trongate, Queenswood and Crest	1,150ea
Basuta	1,100
Dauntless	1,050
Aldershot	1,000
Oakby	800
Total	32,600

Marine Engines built by John Dickinson & Sons, Ltd., Palmer's Hill Engine Works, Sunderland.

Hemisphere	1,750
Moravia	1,900
Harlech	900
Harmony	900
Ovidia	1,700
Port Victoria	2,000
Kirklee	1,900
Tai-chu	4,000
Tai-nan	4,000
Perth	900
Stilbe	1,800
Total	21,750

SCOTCH.

By Ramage & Ferguson, Ltd., Leith.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. N.
† Rosabelle	Composite	Steam	British	439	94
† Vestra	Steel	,,	,,	1,021	99
† Leon Pauilhac	,,	,,	Foreign	308	67
† Gunilda	,,	,,	British	499	109
* Mandolin	,,	,,	,,	82	26
* Gaviño	Composite	,,	,,	102	34
† Kethailes	Steel	,,	,,	467	85
† Ronan	,,	,,	,,	1,350	232
* Chicago	,,	Barge	,,	275	100
By Dundee Shipbuilders' Co., Ltd., Dundee.					
* Balgowan	Steel	Steam	British	290	50
* Largo Bay	,,	,,	,,	130	40
* Curlew	,,	,,	,,	130	40
* Alert	,,	,,	,,	289	52
* Balgay	,,	,,	,,	303	52
† Agincourt	,,	,,	,,	176	60
By Russell & Co., Port-Glasgow.					
Aphrodite	—	Steam	British	3,948	—
Boveric	—	,,	,,	3,970	—
Elleric	—	,,	,,	3,569	—
Devonshire	—	,,	,,	3,643	—
Labuan	—	,,	,,	3,554	—
Arbela	—	,,	,,	3,200	—
Cheronea	—	,,	,,	3,188	—
Platea	—	,,	,,	3,169	—
Paroo	—	,,	,,	2,664	—
Cape Otway	—	,,	,,	2,664	—
Anaces	—	,,	,,	2,534	—
Oakburn	—	Sail	,,	1,637	—
Crocodile	—	Hop'r	,,	706	—
Dromedary	—	,,	,,	706	—
Rhinoceros	—	,,	,,	706	—
Alligator	—	,,	,,	706	—
Hippopotamus	—	,,	,,	706	—
Buffalo	—	Steam	,,	706	—
Britannia	—	,,	,,	315	—
Strathmore	—	,,	,,	315	—
Cassyana	—	,,	Foreign	297	—

* Compound. † Triple.

By Wm. Denny & Bros., Leven Shipyard, Dumbarton.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. N.
Waikare	—	Steam	Foreign	3,071	—
Walton Belle ..	—	,,	British	465	—
Rangoon	—	,,	,,	3,891	—
3 Paddle Steamers	—	—	Foreign	1,290	—
5 ,, ,,	—	—	British	2,650	—
Cambria	—	Steam	,,	1,842	—
Umballa	—	,,	,,	5,867	—
11 Cargo Barges..	—	—	Foreign	3,511	—
2 ,, ,, ..	—	—	British	1,874	—
Rotoiti	—	Steam	Foreign	1,159	—

By Barclay, Curle & Co., Ltd., Whiteinch, Glasgow.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Raglan Castle ..	Steel	Steam	British	4,350	2,600
† Logic	,,	,,	,,	960	1,850

By Geo. Duncan, Bankhead, Macduff, N.B.

Dianthus	Wood	Sail	British	40	—

By Caird & Co., Ltd., Greenock.

† Egypt	Steel	Steam	British	7,912	20,000
† Arabia	,,	,,	,,	7,912	

By Caledon Shipbuilding & Engineering Co., Ltd., Dundee.

† Bittern	Steel	Steam	British	881	900
* Yacht	,,	,,	Foreign	—	200
† Abas Dadascheff..	,,	,,	,,	1,035	650
† Whimbrel.. ..	,,	,,	British	888	900

By Campbeltown Shipbuilding Co., Campbeltown.

† Marzo	Steel	Steam	Foreign	1,257	800
† Abril	,,	,,	,,	1,252	800
† Sigyn	,,	,,	,,	2,087	1,000

By Grangemouth Dockyard Co., Grangemouth.

Hillside	Steel	Sail	British	500	—
* Humber	,,	Steam	,,	287	250
† Clarence	,,	,,	,,	1,100	1,200
† Yukon	,,	,,	,,	1,100	1,200

By Wm. Hamilton & Co., Port-Glasgow.

Wynford	Steel	Sail	British	2,000	—
† Zara	,,	Steam	,,	1,600	1,700
Haytor	,,	Sail	,,	2,000	—

By Murdoch & Murray, Port-Glasgow.

* Cidade de Cameta	Steel	Steam	Foreign	300	450
† Fennia	,,	,,	,,	1,244	800
* Moa	,,	,,	,,	283	450
* Amonazas ..	,,	,,	,,	298	450
† Cidade de Porto de Moz	,,	,,	,,	433	700

By Ritchie, Graham & Milne, Whiteinch, Glasgow.

2 Barges	Steel	—	British	70	—
2 Railway Barges	,,	—	,,	1,400	100
2 Steam Launches..	,,	—	Foreign	36	90
2 Cargo Barges ..	,,	—	British	500	—
2 Screw Tugs ..	,,	—	Foreign	120	320
1 Stern Wheel Steamer	,,	—	,,	25	60
1 Screw Tug.. ..	,,	—	,,	60	160
1 Stern Wheel Steamer	,,	—	,,	40	90
2 Cargo Barges ..	,,	—	,,	400	—
4 Cargo Barges ..	,,	—	,,	200	—

By Charles Connell & Co., Whiteinch, Glasgow.

Craftsman ..	Steel	Steam	British	6,196	3,500
Orwell	,,	,,	,,	3,789	1,700
Indrapura ..	,,	,,	,,	4,899	2,100
Indravelli.. ..	,,	,,	,,	4,899	2,100
Knight Errant ..	,,	,,	,,	7,700	3,500

By Adam Marr Leith.

* Lark	Wood	Steam	British	26	80

* Compound. † Triple.

By John Shearer & Son, Kelvinhaugh, N.B.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
* Clara	Steel	Steam	British	138	—
† Tourmaline ..	,,	,,	,,	860	650
* Chebucto	,,	,,	Foreign	344	400

By Robt. Duncan & Co., Ltd., Port-Glasgow.

Deccan	Steel	Sail	British	1,985	—
Thirlmere ..	,,	Steam	,,	1,852	—
Mount Park ..	,,	,,	,,	1,154	—

By Gourlay Bros. & Co., Dundee.

* Excelsior	Steel	Steam	Foreign	301	—
a Fenchurch ..	,,	,,	British	3,325	—
† Euro	,,	,,	Foreign	255	—
† Batavier II. ..	,,	,,	,,	1,136	—
† Batavier III. ..	,,	,,	,,	1,136	—
† Sir John	,,	,,	,,	411	—
† Wellamo	,,	,,	,,	1,080	—

By A. Munro, Ardrishaig.

Cruachan	Wood	Sail	British	7	All Yachts.
Loch Broom ..	,,	,,	,,	10	
Glenfyne	,,	,,	,,	9	
Almeda	,,	,,	,,	9	

By Cumming & Ellis, Inverkeithing, N.B.

* Marguerite Depeaux	Steel	Steam	Foreign	600	550
* Wellington ..	,,	,,	British	150	550
5 Barges	Iron	—	,,	80ea	—

By Fleming & Ferguson, Ltd., Paisley.

* Ipswich	Steel	Steam	British	250	500
† Owenacurra ..	,,	,,	,,	1,250	900
† Urbs Intacta ..	,,	,,	,,	800	1,400
* Contramaestre Galvez	,,	,,	Foreign	250	500
* Garvogue	,,	,,	British	400	600
† Thasos	,,	,,	Foreign	200	700
* No. 262	,,	,,	British	450	500
* No. 267	,,	,,	,,	1,400	—
* Premier	,,	,,	,,	250	700
3 sets quadruple engines shipped abroad					2,500

By A. & J. Inglis, Pointhouse, Glasgow.

† Pluto	Steel	Steam	British	1,265	1,100
† Bruce	,,	,,	Foreign	1,154	2,500
† Tura	—	—	—	—	500
† Kohima	—	—	—	—	500

London & Glasgow Engineering & Iron Shipbuilding Co., Ltd., Govan, Glasgow.

† Kastalia	Steel	Steam	British	4,039	2,700
† Kassala	,,	,,	,,	3,825	2,400

By Napier, Shanks & Bell, Yoker, Glasgow.

† Kawachi Maru ..	Steel	Steam	Foreign	5,798	3,500
† Sanuki Maru ..	,,	,,	,,	5,809	3,500
† Tamba Maru ..	,,	,,	,,	5,758	3,500

By Alex. Hall & Co., Footdee, Aberdeen.

* Linnet	Steel	Steam	British	127	300
* Kitty	,,	,,	,,	135	320
† Victoria Regina ..	,,	,,	,,	146	350
† Fides	,,	,,	,,	193	410
† City of Aberdeen	,,	,,	,,	193	410
Engines for other Builders					*350 *200

By David & William Henderson & Co., Partick, Glasgow.

† Wakasa Maru ..	Steel	Steam	Foreign	5,873	4 000
† Inaba Maru ..	,,	,,	,,	5,873	4,000
† Bingo Maru ..	,,	,,	,,	5,826	4,000
† Bavaria	,,	,,	British	4,740	3,000
Bona	Composite	—	Foreign	75	—

By Scott & Co., Cartsdyke, Greenock.

† Tuscarora ..	Steel	Steam	British	590	1,000
Nivelli	,,	Sail	,,	2,430	—
Hougomont ..	,,	,,	,,	2,430	—

* Compound. † Triple. a Quadruple

By Alley & Maclellan, Polmadie, Glasgow.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
* Blngoveshchensk .	Steel	Steam	Foreign	249	600
3 Barges	,,	—	,,	470 ea.	—
4 ,, ...	,,	—	,,	476 ea.	—
2 ,, ...	,,	—	British	129 ea.	—
1 ,, ...	Iron	—	,,	5	—
5 ,, ...	Steel	—	Foreign	388 ea.	—
5 ,, ...	,,	—	,,	304 ea.	—
1 ,, ...	Iron	—	British	30	—

By Ailsa Shipbuilding Co., Troon, N.B.

† Andria	Steel	Steam	British	450	1,200
† Konachan ..	,,	,,	,,	69	260
† Latharna	,,	,,	,,	450	800
* The Queen ..	,,	,,	,,	557	600
† Mayflower ..	,,	,,	,,	1,172	900
* Downshire ..	,,	,,	,,	365	500
† Evona	,,	,,	,,	470	600
* M. J. Craig ..	,,	,,	,,	760	800
* —— ..	,,	,,	,,	300	300

By Wm. Simons & Co., Ltd., Renfrew.

* Kate	—	Steam	Foreign	1,000	1,350
* Miles K. Burton ..	—	,,	British	1,550	2,300
* B.D. 2	—	,,	,,	300	520
* Walrus	—	,,	Foreign	1,400	2,760
* Hotspur	—	,,	British	320	970
* 2 Hopper Barges	—	,,	,,	1400ea	1350ea

By James Adam, Gourock.

* Thrasher	Wood	Steam	British	22	25
* Opal	,,	,,	,,	12	10

By William Fife & Son, Fairlie, N.B.

Geisha	Wood	Sail	British	30	—
2 Cutters	,,	,,	,,	20 ea.	—
2 ,, ...	,,	,,	,,	37 ea.	—
1 ,, ...	,,	,,	,,	14	—
1 ,, ...	,,	,,	,,	9	—
2 Sloops	,,	,,	,,	—	—

By Carmichael, Maclean & Co., Main Street, Greenock.

Lovart	Steel	Steam	British	1,020	800
Nautik	,,	,,	Foreign	1,180	810
Cathcartpark ..	,,	,,	British	850	680
Vasco Da Gama ..	,,	,,	,,	170	340
2 Lighters ..	,,	—	Foreign	120 ea.	—
Adolph Andersen	,,	Steam	,,	980	800
Rex	,,	,,	British	280	400
Regina	,,	,,	,,	280	400

By Fairfield Shipbuilding & Engineering Co., Ltd., Govan, Glasgow.

Empress Queen ..	Steel	Steam	British		
H.M.S. Gipsy ..	,,	,,	,,		
,, Fairy ..	,,	,,	,,	10,966	39,200
,, Osprey ..	,,	,,	,,		
Carisbrook Castle	,,	,,	,,		

By John Reid & Co., Ltd, Whiteinch, Glasgow.

Anglo-German ..	Steel	Steam	Foreign	30	60
Mallard	,,	,,	British	120	175
Mingary	,,	,,	,,	251	600

By Mackie & Thomson, Govan, Glasgow.

† 12 vessels	Steel	Steam	British	162ea	300ea
† 19 ,, ...	,,	,,	,,	165ea	300ea
† 2 ,, ...	,,	,,	,,	280ea	750ea
† Pieter Faure ..	,,	,,	,,	179	400
† Merlin	,,	,,	,,	180	300
† Duchess	,,	,,	,,	309	750

By Blackwood & Gordon, Port-Glasgow.

† Kerry	Steel	Steam	British	1,378	3,500
† Labuan	Engines	and bo	ilers only	—	1,500
† Ardela				—	1,500

* Compound. † Triple.

By D. M. Cumming, Blackhill Dock, Glasgow.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H. P. I.
‡ Hornby	Steel	Steam	British	100	80
Eva	,,	Sail	,,	55	—
Ada	,,	,,	,,	55	—
——	,,	,,	,,	40	—
‡ ——	,,	Steam	,,	142	105
‡ Liverpool	,,	,,	,,	100	80
‡ ——	,,	,,	,,	47	45
* ——	Steel & Wd	,,	Foreign	152	200

By David J. Dunlop & Co., Port-Glasgow.

† Annett	Steel	Steam	Foreign	100	250
* Nigeria	,,	,,	British	500	320
† Osceola	,,	,,	,,	450	530
* Land Engine ..	—	—		—	400

By John Fullerton & Co., Paisley.

* Spray	Steel	Steam	British	57	200
* Cloughmore ..	,,	,,	,,	587	500
* Flawn	,,	,,	,,	150	320
* Johe Irwin ..	,,	,,	,,	300	420
* Empress	,,	,,	,,	524	600
* Bute 4	,,	,,	,,	200	350

By Hall, Russell & Co., Ltd., Aberdeen.

* Fife Ness	Steel	Steam	British	130	280
* Champion ..	,,	,,	,,	165	320
* Craig-Gorran ..	,,	,,	,,	126	280
* Challenger ..	,,	,,	,,	143	320
† Ingeli	,,	,,	,,	2,928	2,500
† John Nutton ..	,,	,,	,,	160	320
* Captain	,,	,,	,,	143	320
Also 5 sets of Comp. Engines, 300 h.p. each				—	1,500

By Lobnitz & Co., Ltd., Renfrew.

† Chub	—	Steam	British	150	300
† Tortoise	—	,,	,,	150	300
* Xanthus	—	,,	,,	122	200
* Forsh aw	—	Drdg'r	,,	1 000	750
Stean u ..	—	—	Foreign	50	75
3 Hopper Barges	—	—	,,	350	—
† Cimbria	—	Steam	,,	1,000	1,200
† Uruguay (new m'ch ry)	—	—	,,	—	2,400
† Rio Negro ,,	—	—	,,	—	2,400
Rockcutting plants shipped abroad	—	—	,,	—	500
Sandpump and Dredging Machinery shipped abroad	—	—	,,	—	1,200

By Scott & Sons, Bowling, Glasgow.

* Musgrave	Steel	Steam	British	253	900
† Kyanite	,,	,,	,,	712	700
† Pennant	,,	,,	,,	676	800
† Scott	,,	,,	,,	628	600

By Thomas B. Seath & Co., Rutherglen.

——	Steel	Sail	Foreign	396	—
* Countess of Mayo	,,	Steam	British	69	200
* Hope	,,	,,	Foreign	10	50
* ——	,,	,,	,,	70	250
* ——	,,	,,	,,	60	250

By S. M'Knight & Co., Ayr.

* Latchford	Steel	Steam	British	460	500
* Florence	,,	,,	,,	363	510

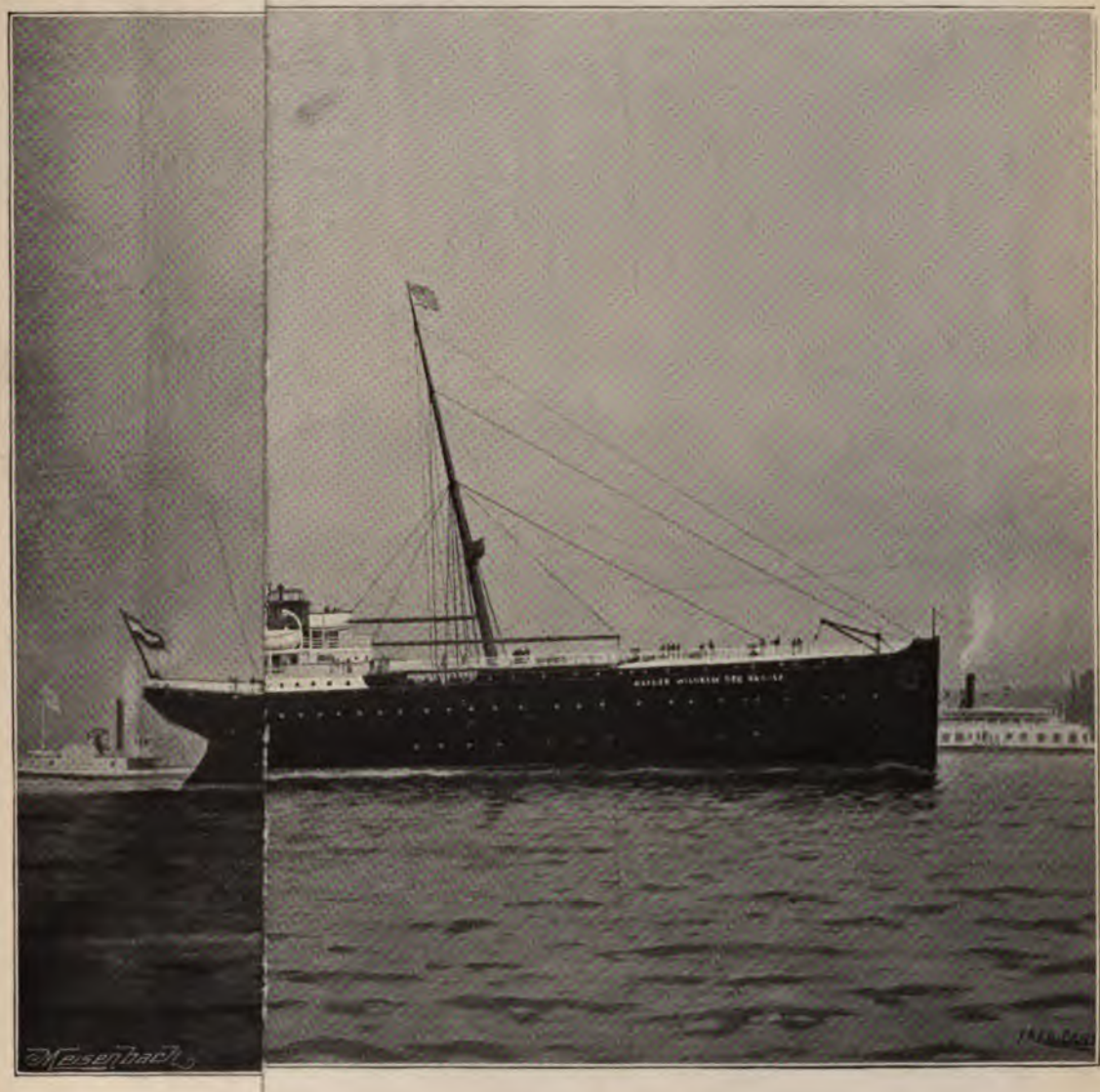
By R. Napier & Sons, Ltd., Lancefield, Glasgow.

Nile	Steel	Steam	British	2,000	—
Dobrogea	,,	,,	Foreign	2,270	1,700
Bucuresti	,,	,,	,,	2,270	1,700
Jassy	,,	,,	,,	2,270	1,700
Macina	,,	,,	,,	1,500	1,450
Kasuga Maru ..	,,	,,	,,	3,350	3,800

By John Scott & Co., Kinghorn, Fifeshire.

† Jaffa	Steel	Steam	British	1,594	1,550
† Karrakatta ..	,,	,,	,,	2,091	1,800

* Compound. † Triple. ‡ High Pressure.



helm der Grosse."

Speed yet obtained, 22·35 knots.

By Alex. Stephen & Sons, Linthouse, Govan.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Sahara	Steel	Steam	British	4,399	1,600
† Vizcaina	,,	,,	,,	2,300	1,000
† Alexandra ..	,,	,,	,,	7 265	5,000
† Boadicea	,,	,,	,,	7,415	5,000
By James Millar, St. Monance, N.B.					
* Newark Castle ..	Wood	Steam	British	85	35
Faithfull	,,	Sail	,,	75	—
3 Fishing Boats ..	—	,,	—	35ea	—
By A. Rodger & Co., Port-Glasgow.					
Glenpark	—	Sail	British	1,959	—
Taymount ..	—	,,	,,	1,615	—
Sutton	—	Steam	,,	2,526	—
Ulverston	—	,,	,,	2,516	—
Cape Breton ..	—	,,	,,	501	—
Mary Park ..	—	,,	,,	3,475	—
Arana	—	,,	,,	1,470	—
Pinta	—	,,	,,	1,470	—
By Archibald McMillan & Son, Ltd., Dockyard, Dumbarton.					
Atagosan Maru ..	Steel	Steam	Foreign	1,936	—
Pena Cabarga ..	,,	,,	,,	1,618	—
Montpelier ..	,,	,,	British	3,483	—
Roda	,,	,,	,,	2,513	—
Campeche ..	,,	,,	Foreign	276	—
Barges, 6 Twn-Scrw	,,	,,	British	1,000	—
By J. McArthur & Co., Paisley.					
x Barge	Steel	—	Foreign	204	—
x ,, ...	,,	—	,,	204	—
Maud	,,	—	,,	174	—
Fairy Queen ..	,,	—	British	51	—
Countess Cadogan	,,	—	,,	55	—
x Screw Steamer ..	,,	—	,,	410	—
x ,, ,, ..	,,	—	,,	410	—
x ,, ,, ..	Iron	—	,,	48	—

Vessels marked x were shipped in pieces for re-erection abroad.

By The Clydebank Engineering and Shipbuilding Co., Ltd., Clydebank, Dumbartonshire.

Audaz	Torpdo. Bt	Dstyr.	Foreign	—	—
Osado	,, ,,	,,	,,	—	—
Nahma	—	Steam	,,	—	—
Europa	—	,,	British	—	—
Brighton Queen ..	—	Pad'le	,,	—	—
20 Barges	—	—	Foreign	—	—
Pluton	Torpdo. Bt	Dstyr.	,,	—	—
Proserpina ..	,, ,,	,,	,,	—	—
			Totals	23,120	55,300

Machinery turned out by Denny & Co., Engine Works, Dumbarton.

Name of Vessel.	Description of Machinery.	Trade.
Moano	Triple single screw ..	Colonial
Waikere	Triple single screw ..	Colonial
No. 454	Compound paddle ..	Colonial
Burma	Triple single screw ..	Eastern
Sardinian	Triple single screw ..	Atlantic
Condor	Triple paddle	River
Vulture	Triple paddle	River
Buzzard	Triple paddle	River
Kamapur	Triple paddle	River
Dholpur	Triple paddle	River
Khanpur	Triple paddle	River
Bahawalpur ..	Triple paddle	River
Dungarpur	Triple paddle	River
Mandalay	Triple paddle	River
Walton Belle ..	Triple paddle	River
Cambria	Triple twin screw	Channel
Umballa	Triple single screw ..	Eastern
Rotoiti	Triple twin screw ..	Colonial
Manipouri	Quadrupling & reboilering	Colonial

Total Indicated horse power, 40,300

* Compound. † Triple.

Engines constructed by Hall, Brown, Buttery & Co., Govan, Glasgow.

Name of Vessel.	Type of Engines.	I.H.P.
Zulmira	Compound surface-condensing, natural draught ..	100
Sutton	Triple exp'sion surface-condensing, natural draught	1,330
Thirlmere	Triple exp'sion s'face c'densing, Howden's fcd. drht.	1,150
Ulverston	Triple exp'sion surface condensing, natural draught	1,300
Mountpark	Triple exp'sion surface condensing, natural draught	820
Cloughmore ..	Compound surface-condensing, natural draught ..	700
Arana	Triple exp'sion surface-condensing, natural draught	920
Pinta	Triple exp'sion surface-condensing, natural draught	920
4 Barges	High-pressure engines ..	60ea
	Total	7,450

Machinery completed by John Cran & Co., Leith.

Marguerite Depeaux	Compound surface-condensing	650
Wellington	,, ,, ,,	500
Kilrenny	,, ,, ,,	200
Innergellie	,, ,, ,,	200
Rothesay Bay ..	,, ,, ,,	200

Messrs. Cran & Co. have also carried through numerous and extensive repairs to vessels in dry dock.

Marine engines built by Rankin & Blackmore, Eagle Foundry, Greenock.

Devonshire	Triple-expansion	1,800
Elleric	Triple	1,800
Strathmore ..	Compnd.surface-condensing	1,100
Britannia	Compnd.surface-condensing	1,100
Aphrodite	Triple	2,150
Boveric	Triple	2,150

Output of Marine Engines and Boilers by Dunsmuir & Jackson, Govan.

Name of Vessel.	Builders.	Working Pressure.
Kawachi Maru ..	Napier, Shanks & Bell ..	200 lbs.
Lady Roberts ..	Ailsa Shipbuilding Co. ..	160 ,,
Nile	Robt. Napier & Son, Ltd. ..	160 ,,
Sanuki Maru ..	Napier, Shanks & Bell ..	200 ,,
Craftsman	Chas. Connell & Co. ..	180 ,,
Orwell	,, ,, ,, ..	170 ,,
Tamba Maru ..	Napier, Shanks & Bell ..	200 ,,
Mary Park	A. Rodger & Co.	175 ,,

Total I.H.P. 22,050.

Machinery constructed by Muir & Houston, Ltd., Harbour Engine Works, Kinning Park, Glasgow.

Name of Vessel.	Owners.	I.H.P.
† 35 Steam Trawlers	British	300 each.
† 1 ,, Yacht	,,	300
† Duchess	Foreign	750
† Kyanite and Mingary	British	750 each
† Latharna and Lovart	,,	1,000 each
* Steamship	Foreign	350
† Pena Cabarga	,,	1,250
† Pieter Faure	,,	400
* The Queen	British	700
† Noord Holland	Foreign	1,000
† Tourmaline	British	800
* Downshire	,,	650
	Total	20,200

Machinery built by McKie & Baxter, Copland Works, Govan Glasgow.
12 sets of engines totalling 1,850 I.H.P.

* Compound † Triple

List of Machinery supplied by David Rowan & Son, Glasgow.

Name of Vessel.	Builders.	Working Pressure.	I.H.P.
Indra	Chas. Connell & Co. ..	200 lbs.	2,100
Fujisan Maru ..	A. McMillan & Son ..	175 ,,	1,650
Atagosan Maru .	,, ,, ..	175 ,,	1,000
Andria	Ailsa Shipbuilding Co.	170 ,,	1,650
Campeche ..	A. McMillan & Son ..	160 ,,	350
Montpelier ..	,, ,, ..	170 ,,	1,700
Indrapura ..	Chas. Connell & Co. ..	200 ,,	2,100
Imani ..	Harland & Wolff ..	180 ,,	2,250
Indravelli ..	Chas. Connell & Co. ..	200 ,,	2,100
Roda	A. McMillan & Son ..	160 ,,	1,200

Machinery turned out by Ross & Duncan, Whitefield Works, Govan, Glasgow.

Set of inverted triple-expansion condensing land engines of 200 I.H.P.; set of compound surface-condensing engines of 200 I.H.P.; four sets of twin-screw triple-expansion engines of 3,300 I.H.P.; set of compound surface-condensing engines of 110 I.H.P.; set of triple-expansion engines of 200 I.H.P.; set of compound surface-condensing engines of 325 I.H.P.; set of compound surface-condensing engines of 500 I.H.P.; set of compound surface-condensing engines of 110 I.H.P.; set of triple-expansion engines of 630 I.H.P.; set of compound surface-condensing engines of 500 I.H.P.; seven sets of compound surface-condensing screw engines of 775 I.H.P.; one set of triple-expansion yacht engines of 150 I.H.P.; Total, 25 sets of engines = 7,000 I.H.P.

Machinery completed by Bow, McLachlan & Co., Thistle Works, Paisley.

5,960 I.H.P., including one set compound surface-condensing stern-wheel engines of 350 I.H.P.; one set compound surface-condensing stern-wheel engines of 450 I.H.P.; two sets compound surface-condensing twin-screw engines, and six sets compound surface-condensing screw engines, all for abroad.

IRISH.

By Harland & Wolff, Ltd., Queen's Island, Belfast.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Delphic	Steel	Steam	British	8,273	2,750
† Goorkha	,,	,,	,,	6,287	2,750
† Rotterdam ..	,,	,,	Foreign	8,302	5,250
† Briton	,,	,,	British	10,248	10,000
† Derbyshire ..	,,	,,	,,	6,636	4,300
a Cymric	,,	,,	,,	12,340	6,700
a Brasilia	,,	,,	Foreign	11,100	3,800
† Winifreda	,,	,,	British	7,020	4,900
† Imani	,,	,,	,,	4,582	2,700
† Monmouth ..	,,	,,	,,	7,950	2,700
Auguste Victoria ..	Lengthened 61 feet; increased tonnage			1,502	—

By Queenstown & Passage Dry Docks Co., Passage West, Co. Cork.

Bathing Vessel ..	Wood	Barge	British	65	—
W. L. & W. R. (2)	Steel	,,	,,	47 ea.	—
G. C. C. 11, 17 & 46	,,	,,	,,	45 ea.	—

Workman, Clark & Co., Ltd., Belfast.

† Glenarm Head ..	Steel	Steam	British	3,908	2,000
† Beverley	,,	,,	,,	1,517	2,500
† Pavia	,,	,,	,,	2,936	1,800
† Tyria	,,	,,	,,	2,936	1,800
† Cypria	,,	,,	,,	2,936	1,800
† Royston Grange ..	,,	,,	,,	3,880	2,200
† Sado Maru ..	,,	,,	Foreign	5,830	4,000
4 Lighters ..	Iron	—	—	170 ea.	—

AMERICAN.

By Atlantic Works, East Boston, Mass., U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Daniel Manning ..	Composite	St & sl.	Americn	629	2,500

† Triple. *a* Quadruple.

By Chicago Shipbuilding Co., South Chicago, Ill., U.S.A.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
a Crescent City ..	Steel	Steam	Americn	4,213	1,800
Carrington ..	,,	Barge	,,	3,180	—
† Minneapolis ..	,,	Steam	,,	2,029	1,000
† St. Paul	,,	,,	,,	2,029	1,000
Amazon	,,	Barge	,,	3,599	—
Australia	,,	,,	,,	ab3800	—

By Cleveland Shipbuilding Co., Cleveland, O., U.S.A.

† Andrew Carnegie	Steel	Steam	Americn	4,106	1,700
a Empire City ..	,,	,,	,,	4,118	1,700

By Wm. Cramp & Sons, Philadelphia, U.S.A.

† Miami	Steel	Steam	Americn	2,000	1,600
† Dorothea	,,	,,	,,	400	1,200

By Delaware River Iron Shipbuilding & Engine Works, Chester, P.A., U.S.A.

† Princess Anne ..	Steel	Steam	Americn	3,078	3,600

By Harlan & Hollingsworth Co., Wilmington, Del., U.S.A.

* New York	Steel	Steam	Americn	540	800
† Juniata	,,	,,	,,	2,551	2,600
† Alcedo	,,	,,	,,	434	850
* Anson M. Bangs ..	,,	,,	,,	178	450
† Niagara	,,	,,	,,	—	1,800
Hildegarde ..	,,	Sail	,,	184	—

By Neafie & Levy, Penn Works, Philadelphia.

† Plymouth	Steel	Steam	Americn	428	875
* Philadelphia ..	,,	,,	,,	300	720
† Ericsson	,,	,,	,,	897	500
* Annie L. Vansciver	,,	,,	,,	146	220

By F. W. Wheeler & Co., West Bay City, Mich., U.S.A.

W. Le Baron Jenney	Steel	Sail	Americn	ab3500	—
† Niagara	,,	Steam	,,	1,483	1,200
† Robert W. Wilmot	,,	,,	,,	277	1,800
† William H. Brown	,,	,,	,,	320	1,800

By Globe Iron Works Co., Cleveland, O., U.S.A.

Sidney G. Thomas	Steel	Sail	Americn	3,200	—
Antrim	,,	,,	,,	3,200	—
Polynesia	,,	,,	,,	3,562	—

By Charles Hillman, Ship & Engine Building Co., Philadelphia, U.S.A.

* G. F. Brady ..	Steel	Steam	Americn	182	300
* Pencoyd	,,	,,	,,	119	275
* New Brunswick ..	,,	,,	,,	1,275	2,000

By Union Dry Docks Co., Buffalo, U.S.A.

S. O. Co., 81 ..	Steel	Barge	Americn	1,774	—
Starrucca	,,	Steam	,,	3,114	—
Armenia (Tug) ..	,,	,,	,,	123	—
Reciprocity ..	,,	,,	,,	525	—
Monroe Doctrine	,,	,,	,,	525	—
Queen (Tug) ..	,,	,,	,,	29	—

By Fore River Engine Co., Weymouth, Mass., U.S.A.

Sally	Wood	Steam	Americn	994	150
* Arrow	,,	,,	,,	5	18
† Ladoga	,,	,,	,,	65	275

By American Steel Barge Company, Cleveland.

Constitution ..	—	Barge	Foreign	2,998	—

By Bertram Engine Works, Toronto.

Keenora	—	Steam	Foreign	486	39

SPANISH.

By Compania Transatlantica, Cadiz.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
Auxiliar No. 5 ..	,,	Steam	Foreign	36	50
,, No. 6 ..	,,	,,	,,	70	300
——	,,	,,	,,	940	600

* Compound. † Triple *a* Quadruple.

GERMANY.

By Actien Gesellschaft Neptun Schiffswerft & Maschinenfabrik, Rostock.

Name of Vessel.	Built of	Class.	Owners	G.T. Regis.	H.P. I.
† Tai-Yick	Steel	Steam	German	1,677	900
† Dora	,,	,,	,,	2,200	800
† Tai-Fu	,,	,,	,,	1,677	900
* Heppens	,,	,,	,,	170	280
† Anna Vodeus ..	,,	,,	,,	1,417	600
† Norderney ..	,,	,,	,,	1.235	550
† Wilhelm Behrens	,,	,,	,,	1,417	600
* Jade	,,	,,	,,	170	280
* Rüstringen ..	,,	,,	,,	170	280
* Schillig	,,	,,	,,	170	280

By Blohm & Voss, Hamburg.

a Della	Steel	Steam	—	4,860	2,100
† Coblenz	,,	,,	—	3,170	1,600
a Pernambuco ..	,,	,,	—	4,790	2,000
a Pretoria	,,	,,	—	12,900	5,500
a San Nicolas ..	,,	,,	—	4,790	2,200

One Floating Dock of 17,500 tons Lifting Power.

By Flensburger Schiffsbau Gesellschaft, Flensburg.

† Aragonia	Steel	Steam	German	5,445	1,800
† Ekliptika	,,	,,	Danish	2,166	900
† Meissen	,,	,,	German	5,209	2,500
† Nordland	,,	,,	Danish	1,650	625
† Itauri	,,	,,	German	4,639	1,750
† Octavia	,,	,,	,,	4,850	1,800
† Tertia	,,	,,	,,	2,110	820
† No. 175	,,	,,	Danish	4,500	1,600

Off-shore Dock lifting vessels of about 4,000 gross reg. tons.

By Gebruder Sachsenberg Gesellschaft mit Beschrankter Haftung, Rosslau, Elbe, Anhalt.

† Stadt Strassburg No. I.	Steel	Steam	German	520	Tons displacement.	1,100
* Nordost	,,	,,	,,	155		250
* Mungo	,,	,,	Foreign	35		55
* Wladiwostock ..	,,	,,	,,	37		100
* Primus	,,	,,	German	250		300
* Stachelhaus & Buchloh No. III.	,,	,,	,,	222		600
† Louis Gutjahr No. XI.	,,	,,	,,	155		350
† Wilhelm	,,	,,	,,	93		140
* Marie	,,	,,	,,	65		200
* Marracuene ..	,,	,,	Foreign	30		60
* Coolella	,,	,,	,,	30		60
B.S.G. 52.. ..	,,	Sail	German	450		—
B.S.G. 53.. ..	,,	,,	,,	450		—
Bongo I. to V. ..	,,	,,	Foreign	42ea		—
,, VI. ..	,,	,,	,,	30		—
Munitionsprahm..	,,	,,	German	212		—
,, ..	,,	,,	,,	212		—

By Howaldtswerke, Kiel.

† Hsi Ping	Steel	Steam	Chinese	1,979	1,100
† Silvana	,,	,,	German	804	1,400
† Karin	,,	,,	Swedish	1,132	550
† Turnu-Severin ..	,,	,,	Rmanian	ab2280	1,200
† Constanta.. ..	,,	,,	,,	ab2280	1,200
† Knivsberg.. ..	,,	,,	German	1,033	600
* 22de Febrero ..	,,	,,	Hondras	ab 13	22
* Ledokol Donskich Girl	,,	,,	Russian	260	530
* August	,,	,,	German	ab 70	95
* Hermann	,,	,,	,,	ab 55	65

By Janssen & Schmilinsky, Hamburg.

* Germania.. ..	Steel	Steam	German	42	200
* Habicht	,,	,,	,,	165·4	260
* Hedwig von Wissmann	,,	,,	,,	48	85
* Cuxhaven.. ..	,,	,,	,,	67·9	260
* Lootse	,,	,,	,,	73·6	250
* Deicher	,,	,,	,,	36	145
* Fairplay III. ..	,,	,,	,,	68	275
* Johann Wilhelm	,,	,,	,,	13·5	40

* Compound. † Triple. *a* Quadruple.

By J. W. Klawitter, Danzig.

Name of Vessel.	Built of	Class.	Owners	G.T. Regis.	H.P. I.
* D. P. XI.	Steel	Steam	German	150	75
* D. P. XII... ..	,,	,,	,,	150	75
* Magdiburg ..	,,	,,	,,	155	170
* Stade	,,	,,	,,	180	600
* Falkenssein ..	,,	,,	,,	180	300
* No 214 Fribbe ..	,,	,,	,,	15	40
† No. 216	,,	,,	,,	90	200
* Weichsel	,,	,,	,,	150	220

By Rickmers Co., Bremerhaven.

Erik Rickmers ..	Steel	Sail	German	2,050	—
* Bangkok ..	,,	Pad'le	,,	230	280
Kurachee	,,	Lig'tr	,,	289	--
Madras	,,	,,	,,	283	—
Delhi	,,	,,	,,	287	—
Odessa	,,	,,	,,	293	—
Libau	,,	,,	,,	284	—
Reval	,,	,,	,,	285	—

By Reiherstieg Schiffswerfte und Maschinenfabrik, Hamburg.

a Petropolis.. ..	Steel	Steam	German	4,792	1,950
a Belgrano	,,	,,	,,	4,792	1,950

By Schiffswerft von Henry Koch, Lubeck.

† Tanger	Steel	Steam	German	1,507	540
* Malmo	,,	,,	Swedish	sa380	660
† Baltic	,,	,,	Russian	—	700
Ulk..	,,	Barge	German	398	—
Schalk	,,	,,	,,	398	—
Correspondent ..	,,	,,	,,	398	—
Nos. 86 and 87 ..	,,	,,	,,	ea. 110	—

By J. C. Tecklenborg, A-G., Bremerhaven, Geestemunde.

Seeleichter 83 ..	Steel	—	German	280	—
,, 84 ..	,,	—	,,	280	—
* Dampfschute II.	,,	Steam	,,	400	200
† Mainz	,,	,,	,,	3,500	1,700
* Rhein	,,	,,	,,	850	400
Schleppkahn 89 ..	,,	—	,,	560	—
,, 90 ..	,,	—	,,	560	—

By Vulcan & Co., Stettin.

† Kaiser Wilhelm der Grosse	Steel	Steam	German	14,350	27,000
† Hei Yung	,,	,,	Chinese	*b* 3,000	7,500
† Not named	,,	,,	,,	*b* 3,000	7,500
a Hertha	,,	,,	German	*b* 5,650	10,000

b Tons displacement.

By Bremer Vulkan, Vegesack.

Johann Albrecht	—	Steam	Foreign	180	26
Five trawlers ..	—	,,	,,	150 ea.	25 ea.

By Actien Gesellschaft "Weser," Bremen.

Planet	—	Steam	Foreign	43	90
Ahha	—	,,	,,	1,047	425
4 Lighters ..	—	,,	,,	648 ea.	—
Argo II. ..	—	,,	,,	209	—
2 Coal barges ..	—	,,	,,	244 ea.	—

By H. N. Wischorlt, Hamburg.

Koln	—	Steam	Foreign	400	20

By F. Schichau, Danzig.

2 Tugs	—	Steam	Foreign	600 ea.	1100ea.
Kaiser Friedrich..	—	,,	,,	12,500	28,000

By Schiff-und-Maschinenbau-Actien Gesellschaft "Germania," Kiel.

Baden	—	Steam	Foreign	—	5,000
2 T.B.D.	—	,,	,,	—	7,000
——	—	,,	,,	—	2,500
——	—	,,	,,	—	6,000
——	—	,,	,,	—	50
——	—	,,	,,	—	50
Konig Wilhelm ..	—	,,	,,	—	13,000

By Oderwerke Actien Gesellschaft, Stettin.

Aga Selim ..	—	Steam	Foreign	700	45
Imperator ..	—	,,	,,	1,079	178

* Compound. † Triple. *a* Quadruple.

By Johansen & Co., Danzig.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
Welle	—	Steam	Foreign	—	110
Strerve	—	,,	,,	—	150
Two dredgers ..	—	,,	,,	—	120
Vistula	—	,,	,,	—	150
By F. W. Wencke, Bremerhaven.					
2 Lighters ..	—	Steam	Foreign	240	—
No. 94	—	,,	,,	112	—
,, 95	—	,,	,,	40	—
,, 96	—	,,	,,	120	—
,, 97	—	,,	,,	12	—
2 Lighters ..	—	,,	,,	35 ea.	—
No. 100	—	,,	,,	200 ea.	—
,, 101	—	,,	,,	90	—
4 boats	—	,,	,,	200	—
No. 106	—	,,	,,	90	—
By B. Wencke, Hamburg					
Bd. Blumenfeld ..	—	Steam	Foreign	45	240ea.
Hafenpolizei VI...	—	,,	,,	20	65
Entenwarder ..	—	,,	,,	19	75
2 Launches ..	—	,,	,,	19	80 ea.
By G. Seebeek, Bremerhaven.					
Kaiser Wilhelm II.	—	Steam	Foreign	100	25
Hanseat	—	,,	,,	146	45

FRENCH.

By La Cie. des Messageries Maritimes, La Ciotat.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Indus	Steel	Steam	French	6,400	7,200
By Les Chantiers de la Seyne.					
Jacqueline ..	Steel	Sail	French	3,063	—
† Dupleix	,,	Steam	,,	2,546	2,800
† Cholon	,,	,,	,,	4,300	2,800
By E. Lucas & Co., Dieppe.					
Denise	—	Steam	Foreign	120	200
2 vessels	—	,,	,,	60	120
Fin de Siecle ..	—	,,	,,	90	120
2 vessels	—	,,	,,	25	50
Roubasien ..	—	,,	,,	100	150
By A. Dubigeon, Nantes.					
Lombard	—	Sail	Foreign	452	—
By De la Brosse & Fouche, Nantes.					
Fostimore ..	—	Steam	Foreign	253	31
By Laporte & Co., Rouen.					
Dunkerque ..	—	Sail	Foreign	4.000	—
4 vessels	—	,,	,,	2,550	—
3 vessels	—	,,	,,	3,500	—

AUSTRIAN.

By Stabilimento Tecnico, Trieste.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Pelagosa	Steel	Steam	Austrian	280	700
† Pluto	,,	,,	,,	110	250
* Princyp	,,	,,	Russian	680	500
† Duna	,,	,,	Austrian	280	250
* 3 Tugs	,,	,,	,,	80	200
Floating Crane ..	Wood	,,	,,	200	50
† Zenta (engines only)	—		,,	—	7,200
By Marco U. Martinolich, Lussinpiccolo.					
* Miramar	Wood	Steam	Austrian	—	70
† S. Marco	Steel	,,	,,	—	400
By Lloyd Austriaco, Trieste.					
Trieste	—	Steam	Foreign	5,095	3,200
Drana	—	,,	,,	143	250
By Howaldt & Co., Fiume.					
Kitarto	—	Steam	Foreign	27	100
No. 1	—	,,	,,	8	22

* Compound. † Triple.

SWEDEN.

By Kockums Mekaniska Werkstad, Aktiebolag, Malmo.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
* Adschi-Aga ..	Steel	Steam	Russian	1,019	762
By Motala Werkstads Nya, A.B. Motala.					
* Zander	Steel	Steam	Foreign	—	250
* Mogul	,,	,,	,,	—	200
By Oskarshamns Mekaniska Verkstads, Oskarshamn.					
Titania	—	Steam	Foreign	752	550
By Bergsunds Mekaniska Verkstads, Stockholm.					
Oden	—	Steam	Foreign	3,000	5,000
Kahn Usejnoff ..	—	,,	,,	833	500
Don Carlos ..	—	,,	,,	25	115
Elisabeth	—	,,	,,	21	90
Bel-Beck ..	—	,,	,,	247	300
17 pinnaces ..	—	,,	,,	153	391
By G. & H. Bodewes, Martenshoek.					
Speculant.. ..	—	Steam	Foreign	120	—
H. & M. No. 10 ..	—	,,	,,	175	—
Alberdina.. ..	—	Sail	,,	88	—
Spes Vera.. ..	—	,,	,,	198	—
Wienke & Wijuand	—	,,	,,	125	—
2 vessels	—	,,	,,	66ea	—
Wilhelmina ..	—	,,	,,	131	—
Margaretha ..	—	,,	,,	55	—
Claudine	—	,,	,,	52	—
God met Ons ..	—	,,	,,	420	—
Ebenhaezer ..	—	,,	,,	300	—
2 vessels	—	,,	,,	60ea	—

HOLLAND.

By Royal Shipbuilding and Engineering Co. de Schelde, Flushing.

Name of Vessel.	Built of	Class.	Owners.	G. T. Regis.	H.P. I.
† Edi	Steel	Steam	Dutch	b810	1,300
† Serdang	,,	,,	,,	b810	1,300
† Zeeland	,,	,,	,,	b3,900	10,000

b Tons displacement.

By Werf Conrad, Ltd., Haarlem.

Barge No. 1 ..	Steel	Tow'g	Russian	150	—
,, No. 2 ..	,,	,,	,,	150	—
† Alexander Barmins by	,,	Steam	,,	300	550
* Chiveve	,,	,,	French	300	200
* Portugal	,,	Dredg	,,	300	200
* Dnieprovshaia, 3	,,	,,	Russian	330	350
* Michaelsufaevshi	,,	,,	,,	450	500
* Indramajoe ..	,,	,,	Nether'd	160	180
† Huelva	,,	,,	Spanish	800	500
* Olvia	,,	,,	Russian	400	200
* Divshuria.. ..	,,	,,	,,	400	200
By L. Smit & Zoon, Kinderdijik.					
Neptun	—	Steam	Foreign	600	1,000
W. F. Lemans ..	—	,,	,,	450	800
2 tugs	—	,,	,,	550ea	600ea
Nercus	—	,,	,,	600	450
Wartergeus II. ..	—	,,	,,	400	280
Petrus	—	,,	,,	280	200
Senior	—	,,	,,	200	150
5 yachts	—	,,	,,	25ea	50ea

An addition the firm completed several small electric and oil launches, &c.

By F. F. Groen, Amsterdam.

Nicholaas Witsen	—	Sail	Foreign	1,700	

By Nederlandsche Scheepsbouw Maats-Chappij, Amsterdam.

Prins Willem V...	—	Steam	Foreign	1,744	1,380
2 Barges	—	Hop'r	,,	275ea	300ea
Madura	—	Steam	,,	3,362	1,580

By Rijkee & Co., Rotterdam.

2 vessels.. ..	—	Steam	Foreign	800ea	80 ea

* Compound † Triple.

NORWAY.

By Bergens Mekaniske Værksted A.B., Bergen.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
† Belvernon	Steel	Steam	Norweg.	1,092	900
† Hildur	,,	,,	,,	966	540
† Trudvang	,,	,,	,,	1,041	540
By Mylands Mekaniske, Vœkksted, Christiania.					
Ring	—	Steam	Foreign	993	800
Bayard	—	,,	,,	1,001	800
Albis	—	,,	,,	1,431	800
Breid	—	,,	,,	1,100	800
By Fredrikstads Mek. Vœrkted, Fredrikstads.					
Fredrikstad ..	—	Steam	Foreign	107	175
Premier	—	,,	,,	450	400
By Stavanger Stoberi & Dok, Stavanger.					
Stavanger ..	—	Steam	Foreign	331	430
By Akers Mekaniske, Vœrksted, Christiania.					
Salsmanca ..	—	Steam	Foreign	950	660
Finn	—	,,	,,	62	100
Finmark	—	,,	,,	40	80
Borregaard ..	—	,,	,,	640	430
Horten	—	,,	,,	213	330
2 vessels	—	,,	,,	90ea	230 ea.
Fram	—	,,	,,	128	100
By Fevios Jernskibsbyggeri, Fevig.					
Alabama	—	Steam	Foreign	936	1,000
Ragnar	—	,,	,,	1,075	1,000
By Throndhjems Mekaniske, Voerkstad, Drohthiem.					
Bygds	—	Steam	Foreign	135	235
Senjen	—	,,	,,	300	300
2 engines	—	,,	,,	—	650

BELGIUM.

By Societe Anonyme John Cockerill, Hoboken.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
* Princess Clementine	Steel	Steam	Foreign	—	8,300
† Rubis, Topaze, and Saphir	,,	,,	,,	each	1,900
* Khabarowsk ..	,,	Pad'le	,,	—	900
* No. 359	,,	,,	,,	—	700
* ,, 360	,,	,,	,,	—	700
* ,, 361	,,	,,	,,	—	125
* Michel	,,	,,	,,	—	500
* Cockerill	,,	—	,,	—	100
* No. 364	,,	—	,,	—	220

Also a lot of steel barges, cutters, and whaleboats for the Amour and Congo.

ITALIAN.

By Geo. Ansaldo & Co., Sestri, Ponente.

Name of Vessel.	Built of	Class.	Owners.	G.T. Regis.	H.P. I.
† Giuseppe Garibaldi	Steel	Steam	Italian	4,478	14,000
* Bisagno	,,	Dredg	,,	420	285
By Orlandi Bros., Leghorn.					
† Varese	Steel	Steam	Italian	—	13,000
By Cantiere Poli, Chioggia, Venice.					
* San Felice ..	Steel	Steam	Italian	59·34	100
* San Fortunato ..	,,	,,	,,	59·34	100
5 Cargo Boats ..	,,	—	,,	90	—
3 Cargo Boats ..	,,	—	,,	12	—
2 Pontoons ..	,,	—	,,	30	—
By N. Oderi Foce, Genoa.					
Savoia	—	Steam	Foreign	4,376	6,100

* Compound. † Triple.

Summary of Shipbuilding Returns of United Kingdom in 1897 arranged in order of Tonnage built by each Firm.

	Name of Firm.	Place.	No. of Ships.	Total Tons.
1	Harland & Wolff	Belfast	11	84,240
2	C. S. Swan & Hunter	Tyne	11	48,570
3	Wm. Gray & Co., Ltd.....	Hartlepool	20	47,453
4	Russell & Co.....	Clyde	21	42,912
5	Palmer's Shipbuilding Co. ..	Tyne	13	40,319
6	J. L. Thompson & Sons, Ltd.	Wear	10	33,176
7	Wm. Doxford & Son, Ltd. ..	Wear	9	30,674
8	Short Bros.	Wear	10	30,560
9	Sir Raylton Dixon & Co.....	Tees	11	30,420
10	Sir Wm. Armstrong, Whitworth & Co., Ltd.....	Tyne	13	29,242
11	Charles Connell & Co.....	Clyde	5	27,483
12	Wm. Denny & Bros.....	Clyde	27	25,120
13	Workman, Clark & Co.	Belfast	11	24,623
14	J. Readhead & Sons	Tyne	8	23,659
15	Clydebank Engineering and Shipbuilding Co., Ltd.....	Clyde	27	23,120
16	Ropner & Son	Tees	8	22,578
17	D. & W. Henderson & Co ...	Clyde	5	22,387
18	A. Stephen & Sons.....	Clyde	4	21,379
19	Wigham Richardson & Co...	Tyne	8	18,217
20	Tyne Iron Shipbuilding Co.	Tyne	5	18,020
21	Napier, Shanks & Bell	Clyde	3	17,365
22	Furness, Withy & Co., Ltd...	Hartlepool	4	16,235
23	Vickers, Sons & Maxim, Ltd.	Barrow	6	16,122
24	Sir James Laing	Wear	5	15,937
25	Caird & Co., Ltd	Clyde	2	15,824
26	A. Rodger & Co.	Clyde	8	15,536
27	Robert Thompson & Sons ...	Wear	6	15,436
28	Richardson, Duck & Co.....	Tees	7	15,039
29	R. Napier & Sons	Clyde	6	13,660
30	John Priestman & Co.., ...	Wear	5	12,660
31	Craig, Taylor & Co.....	Tees	5	11,847
32	Fairfield Shipbuilding Co., Ltd.....	Clyde	5	10,966
33	J. Blumer & Co.	Sunderland	4	10,868
34	W. Dobson & Co	Tyne	12	10,862
35	A. McMillan & Son, Ltd.....	Clyde	11	10,826
36	Bartram & Sons	Wear	3	10,628
37	R. Craggs & Sons	Tees	8	9,329
38	Laird Bros.	Mersey	9	8,207
39	London and Glasgow Shipbuilding Co.	Clyde	2	7,864
40	Gourlay Bros. & Co.	Dundee	7	7,644
41	Simons & Co., Ltd.	Clyde	7	7,370
42	Alley & Maclellan	Clyde	22	7,316
43	Wood, Skinner & Co.	Tyne	7	7,126
44	S. P. Austin & Son, Ltd.....	Sunderland	4	7,075
45	R. & W. Hawthorn, Leslie & Co., Ltd.	Tyne	14	6,449
46	Mackie & Thomson	Clyde	36	6,307
47	Edwards Bros.	Tyne	35	6,147
48	W. Pickersgill & Son	Wear	2	5,954
49	Wm. Hamilton & Co.	Clyde	3	5,600
50	A. W. Robertson & Co.	Thames	50	5,572
51	Scott & Co.	Greenock	3	5,450
52	Barclay, Curle & Co., Ltd....	Clyde	2	5,310
53	Fleming & Ferguson	Paisley	9	5,250
54	Blyth Shipbuilding Co., Ltd.	Blyth	2	5,183
55	Carmichael, Maclean & Co.	Greenock	9	5,000
56	R. Duncan & Co.....	Clyde	3	4,991
57	Earle's Shipbuilding Co.,Ltd.	Humber	9	4,781
58	Sunderland Shipbuilding Co.	Sunderland	4	4,660
59	CampbeltownShipbuildingCo	Campbeltown	3	4,596
60	Ailsa Shipbuilding Co.	Troon	9	4,593
61	Ramage & Ferguson	Leith	9	4,543
62	Cochrane & Cooper	Beverley	23	3,919
63	Hall, Russell & Co., Ltd. ...	Aberdeen	7	3,795
64	John Scott & Co.	Kinghorn	2	3,685
65	R. Williamson & Son	Workington	10	3,452
66	Cook, Welton & Gemmell ...	Hull	19	3,125
67	Grangemouth Dockyard Co.	Grangemouth	4	2,987
68	Ritchie, Graham & Milne ...	Clyde	19	2,851
69	Lobnitz & Co. Ltd.	Renfrew	9	2,822
70	Caledon Shipbuilding and Engineering Co. Ltd.	Dundee	3	2,804

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from November 24th to December 21st, 1897:—

Bowing, John, engineer to the *Cæsar*, to date January 13th.

Bryan, Richard, engineer to the *Lynx*, undated.

Carey, John J., staff engineer to the *Northumberland*, to date December 6th.

Carruthers, David J., engineer to the *Illustrious*, to date November 25th.

Christian, Thomas W., engineer to the *Victoria and Albert*, to date December 11th.

Cocks, Herbert W. L., assistant engineer to the *Cæsar*, to date January 13th.

Cutlack, Percy E., (probationary) assistant engineer to the *Vivid*, to date November 20th.

Dalzell, Thomas B., (probationary) assistant engineer to the *Flora*, to date January 13th.

Darley, Herbert J., (probationary) assistant engineer to the *Cæsar*, to date January 13th.

Deacon, Alfred E. C., engineer to the *Osprey*, to date December 1st.

Forbes, John W., (probationary) assistant engineer to the *Cæsar*, to date January 13th.

Ford, Hugh L., assistant engineer (temporary) to the *Northampton*, to date January 13th.

Frost, J. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Green, T., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hicks, John A. H., staff engineer to the *Edinburgh*, to date December 6th.

Hole, J. W., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Hughes, Henry R. S., assistant engineer (temporary) to the *Majestic*, to date January 13th.

James, Charles J., chief engineer to the *Bat*, to date November 27th.

Jarvis, Frederick, engineer to the *Flora*, to date January 13th.

Kent, Walter J., engineer to the *Thrasher*, to date November 27th.

Little, Edwin, fleet engineer to the *Cæsar*, to date January 13th.

Lyon, Francis H., (probationary) assistant engineer to the *Pembroke*, to date November 10th.

Meynell, Piers H., (probationary) assistant engineer to the *Pembroke*, to date November 10th.

Murray, T. W. S., assistant engineer, has been promoted to the rank of engineer in Her Majesty's fleet.

Parsons, William G., fleet engineer to the *Iron Duke*, to date December 6th.

Raper, Robert St. J., engineer to the *Skate*, undated.

Richardson, J., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Richardson, John, chief engineer to the *Prometheus*, to date November 1st.

Robinson, Henry D., (probationary) assistant engineer to the *Victory*, to date November 10th.

Robinson, Henry D., (probationary) assistant engineer to the *Mars*, to date January 13th.

Roe, Charles E. M., (probationary) assistant engineer to the *Vivid*, to date November 10th.

Spry, Frederick M. D., chief engineer to the *Salamander*, to date December 1st.

Starr, George H., (probationary) assistant engineer to the *Victory*, to date November 10th.

Starr, George H., (probationary) assistant engineer to the *Trafalgar*, to date January 13th.

Stokes, Walter, assistant engineer to the *Cæsar*, to date January 13th.

Stuart, J. J., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Swift, Lionel W., assistant engineer to the *Flora*, to date January 13th.

Turner, A. W., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Underhill, Arthur M., assistant engineer to the *Wildfire*, additional, to date December 18th.

Wallace, Thomas H., engineer to the *Pembroke*, to date November 25th.

Westaway, Albert E. L., staff engineer to the *Flora*, to date January 13th.

White, Arthur F., assistant engineer to the *Defiance*, to date January 13th.

Wright, Wallace, engineer to the *Spitfire*, to date November 25th.

HOAR & BROWN'S HARDWOOD MARKET REPORT, DECEMBER 21st. 1897.

	Timber. Loads.	Planks. Loads.	Blocks. Loads.	Total. Loads.
Stock, Dec. 1st	9,581	3,063	15	12,659
Landings	1,483	471	—	1,954
	11,064	3,534	15	14,613
Deliveries	667	176	—	843
Stock, Dec. 18th	10,397	3,358	15	13,770

Logs.—Since the slight decline in prices last month, the market is only holding fairly firm. Importers experience a difficulty in making ready sales of floating parcels, and first-hand landed stocks are also neglected, although owners are anxious to make a clean book before Christmas, and with that view are inclined to meet the dull state of the market. The engineers' strike has considerably interfered with stock holders and speculative purchasers, but upon the dispute being settled prices will again rally and business assume its late briskness.

The deliveries this year show a falling off to the extent of nearly 20 per cent. as compared with 1896. Logs in stock consist of 10,397 loads as against 9,667 loads at this time last year. The railway companies have been fairly busy, and their requirements in teak reached the usual standard. The shipbuilders must soon be expected in the market, and the large requisition made by H.M. Government for 7,000 loads, together with the certainty of short future supplies, ought to generate a very firm position for the New Year.

Second class timber has accumulated and may tend to bring about some low quotations, but this, as a rule, does not interfere with the trade in better class wood.

Planks.—The stock is still heavy, and importers have lately shown a slightly weakening hand with respect to c.i.f. prices. Some holders of floating goods, becoming alarmed at the indifference displayed by purchasers during the time of the labour dispute, are trying to push business through at a reduction upon market values which is really supposed to represent a small loss for shippers' account.

Mahogany.—Honduras.—There is a good demand, and prices continue firm, especially for medium to large sizes. Nicaraguan.—The supply has been short but enquiries are not brisk, and some low quotations are reported. Tobasco.—Imports have been very light, values remain firm, and the stock in first hands is practically nil. Fresh supplies are anxiously awaited. Panama.—The parcels recently offered at public sale found good competition. Stocks are very low and sound, good logs would find ready buyers. African.—The bold tactics displayed by shippers in bringing such large quantities to this country have caused stock holders to withdraw from further purchasing, and await the course of events which usually follow such an accumulation of stock. Large shipments of inferior quality and small sizes have caused prices to decline from 20 to 30 per cent. during the last few months, and stocks at present held by dealers are the lowest priced on record.

St. Domingo.—The late importation was readily taken by eager buyers at public sale, and prices were run up steadily. Cuba.—Stocks have become very low, and figures paid at the last auction showed a decided advance upon previous limits

Cedar (Honduras and Tobasco).—The market for this is flat in consequence of shipments from other districts of inferior and low priced parcels. Paraguay.—Business is very slow, and stocks ample. Some Australian was offered lately without reserve, the figures were low, and little desire was shown to purchase.

Sequoia.—The demand is moderate. Quotations have not varied lately and the stock is sufficient.

Kawrie Pine.—There is an increasing demand with advanced prices and a light stock.

WALNUT.—Logs of inferior quality and manufacture predominate, but shippers are firm in quoting. For the small proportion of superior quality prices are good.

GREENHEART.—Some satisfactory business is being done and values are firm.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

DURING November and what has already gone of December Clyde shipbuilders have turned out about 85,000 tons of new shipping, and if all the vessels are put into the water for which credit is taken by the builders themselves in the returns for the year, to be found elsewhere in this number, thus considerably over 100,000 tons will have been ushered into their native element within the space of two months—a remarkable and probably a record performance. It is altogether due, however, to the engineering dispute and dislocation, vessels being retained on the stocks, pending a settlement, rather than consigned to the water, where congestion and "lay-days" expenses would await them. The fact that such a rush has taken place in getting tonnage afloat may be taken as an indication that the shipbuilders at least are hopeful of an end being put to the deplorable dispute previous to, or coincident with, the season when "peace on earth"—and in the workshop—should reign supreme.

Whether this most desirable consummation will be brought about or not would seem at the time of writing—20th December—to depend on the workmen themselves, who for the second time in this most unfortunate conflict are asked to ballot upon terms arranged in conference between their own representatives and leaders and those of the federated employers. Nothing that is not trite and stale can now possibly be said of the *pros* and *cons* of this deplorable dispute. All that is worth being said has been said, and the best that can be done is to hope for the preponderance of dispassionate good sense on the part of the immense body of voters.

The booking of fresh orders during December—or that portion of it already gone—has been fairly brisk, although the rate at which tonnage was placed during October and November has not been maintained. With a settlement of the engineering difficulties, however, a renewed influx of fresh work may be looked for. If the first part of 1898 does not prove a brisk period in the Clyde engineering and shipbuilding trade, it will, indeed, be surprising. The sooner men and masters adjust their differences—and the more thoroughly they do so—the greater the likelihood of the present flow of orders continuing and waxing stronger.

In consequence of continued ill-health, Mr. Richard Barnwell has resigned his position as managing director of the Fairfield Shipbuilding Co., Limited, but retains his seat at the board. This will entail a change in the present directorate of this great concern, and rumours are rife as to what the change will consist of, but little of a reliable character is as yet known. It is possible that even more thorough-going alterations than any mere modification in or addition to the directorate may soon be announced, and in this connection it was rumoured a week or two ago that the Fairfield Co., Messrs. Easton & Anderson and Messrs. Firth, of Sheffield, were to unite their forces as in some other great combinations now established. The New Year will probably reveal what truth there is in these rumours.

Messrs. Alex. Stephen & Sons, Linthouse, are stated to have received from Messrs. Cayser, Irvine & Co., of the Clan Line, an order to build two additional steamers for their fleet.

Messrs. Robert Napier & Sons, Govan, have been commissioned to build and engine a steel-screw steamer of about 4,500 tons deadweight capability for Messrs. Glen & Co., to be engaged in the general carrying trade.

Messrs. David & William Henderson, Meadowside Yard, Partick, contracted during December with Messrs. Lamport & Holt, of Liverpool, for the construction of a large cargo steamer, to be engined also by the firm.

Messrs. Charles Connell & Co., Whiteinch, who have recently produced several very large deadweight carriers, and have still others on hand for Liverpool owners, have been commissioned by Messrs. Wm. Johnston & Co., Limited, of Liverpool, to build an immense cargo steamer.

Messrs. John Reid & Co., Whiteinch, have received an order to build a steel-screw steamer of about 2,880 tons gross, for Messrs. Maclay & MacIntyre, Glasgow.

Messrs. Wm. Denny & Brothers, Dumbarton, during December contracted to build for Messrs. P. Henderson & Co., Glasgow, a steel-screw steamer of about 6,000 tons deadweight capability, which will be the sixth steamer built by Messrs. Denny for the same firm during the past four years. The new vessel, which will be mainly a repeat of the steamer *Rangoon*, completed for Messrs. Henderson & Co. some months ago, will have accommodation for 40 passengers, and is to be built to the rules and under the supervision of the British Corporation Registry. About the end of November Messrs. Denny delivered to her owners, the London and North Western Railway Co., the fast twin-screw steamer *Cambria*, built for the company's accelerated service between Holyhead and Dublin. On two separate trials over a course of 100 knots in open water, the vessel attained a mean speed of 21·3 and 21.4 knots respectively. She has since had correspondingly satisfactory results on her regular station.

Messrs. Blackwood & Gordon, Port-Glasgow, contracted during the month to build a screw-passenger and cargo steamer of 1,350 tons gross for the Granton and Gothenburg trade of the Thule Shipbuilding Co. of Gothenburg. Engines and boilers to drive the vessel at a good rate of speed will also be supplied by Messrs. Blackwood & Gordon, who have another vessel under way for Swedish owners, and who continue to effect a large amount of repair and overhaul work on their patent slip.

Messrs. Robert Duncan & Co., Port-Glasgow, have arranged to build for Messrs. Troop & Son, of St. John, New Brunswick, a steel screw steamer of about 2,850 tons gross.

The Greenock Water Trust have decided to give water-power to the Aluminium Roller Mill Co.—a branch of the British Aluminium Co. who have already their carbon making works in Greenock—who have purchased a large site occupied by what were previously two large sugar refineries in the vicinity of Victoria Harbour. The new works, for the rolling of aluminium and the alloys of which the metal may form a constituent, will be on a somewhat large scale, and will give employment to several hundreds of workmen.

The Campbeltown Shipbuilding Co. during the month sold to a large Russian firm of shipowners two of the four steamers at present on their stocks. The vessels are expected to be launched early in the new year. The owners intend to engage them in the service between Stockholm and St. Petersburg during the summer months, and in general trading when the Baltic is closed.

The Irvine Shipbuilding and Engineering Co., whose reconstruction and registration as a public company was noticed in our November Notes, are to build for Messrs. J. & P. Hutchison, Glasgow, a steel screw steamer of 600 tons. The Harbour Trust of Irvine have decided to reconstruct and extend about 900 ft. of quayage, and to erect a new 30-ton crane with all the latest improvements. The reconstruction of 600 ft. and the addition of 300 ft. to the wharfage will cost altogether approaching £13,000, towards which the Glasgow and South Western Railway Co. are to contribute £3,000.

The Clyde estuary, and its admirable "measured mile" at Skelmorlie, continue to serve as the arena for "trying the paces" of swift torpedo-boat destroyers, as well as other craft brought from a distance. Messrs. Laird Bros., of Birkenhead, during the early part of the month, took out on trial the 30-knot destroyer *Wolf*, which is the fourteenth vessel of this class produced by this firm. On the measured mile the *Wolf* obtained a mean speed of over 30 knots, the maximum being 30·72 knots. This is the same craft which on the Mersey achieved probably the highest speed, as between point and point, that has ever been recorded, the speed on that occasion being equivalent to over 33 miles an hour.

Messrs. Caldwell & Co., Limited, Elliot Street, Glasgow, have received the order from the Admiralty for the supply of the steering apparatus for the new Royal yacht. It will be fitted in duplicate in each main engine-room, and it will be connected with various stations in the ship, according to the usual Admiralty practice.

Messrs. Ramage & Ferguson, Leith, who have during 1897 launched nine vessels, aggregating 4,543 tons, comprising five steam yachts, three screw steamers, and a barge, have recently laid the keel of a 500-ton steam yacht for Mr. F. D. Lambert. They have also contracted to build for Messrs. A. R. & J. M. Sladen a steam yacht of about 580 tons Y.M., to be ready next

October. Both of these yachts are to be built from designs prepared by Messrs. Cox & King, London.

Shipbuilding in Dundee during 1897 has been decidedly brisker than for a number of years past. From the three shipyards in operation during the year, there have been, or will be, launched before the close of the year, twenty-one steamers with a total gross tonnage of close on 15,000 tons. This gives an average of seven steamers to each yard, and an average tonnage for each steamer of 700 tons gross. Last year Dundee shipbuilders only launched eight vessels of 4,364 tons, and the year previous nine vessels of 8,222 tons. The present aggregate in fact approximates more nearly to the returns for the years 1887 to 1892, the average over which flourishing period reached 18,000 tons, while for the years from 1893 to 1897 the average was only 6,925 tons. Considering that in Dundee builders and engineers have to import all their iron, steel, coal, etc., which in the case of such favoured centres as the Clyde, the Tyne, Tees, etc., practically lie at hand for the picking up, the year's doings must be highly satisfactory.

The coming year also is to be started under most favourable circumstances. Exclusive of the vessels which are intended to be launched before the present year closes, the vessels on the stocks number 14, representing a gross tonnage of about 7,000 tons. Two of these vessels are each of about 1,200 tons gross, and the other two of 1,000 tons, all for the fleet of Messrs. Thos. Wilson, Sons & Co., Hull. They will be notable as being amongst the few merchant vessels as yet fitted with water-tube boilers, these being of the Babcock and Wilcox type. The Dundee Shipbuilders Co. are to build for Mr. J. Constant, London, a steel towing vessel of about 100 tons.

Messrs. John Scott & Co., of Kinghorn, on the Fifeshire coast, launched from their shipyard there on the 13th of the month a steamer of noteworthy dimensions, and, as is the custom in these yards, with all machinery on board and steam up. This was the screw-steamer *Karrakatta*, for the West Australian Steamship Co., managed by Messrs. Bethell, Gwyn, & Co., and Messrs. Trinder, Anderson & Co., London. Her dimensions being 310 ft. in length; 42 ft. beam; 18 ft. 9 in. depth; moulded to main deck, and 2,090 tons gross. She is elaborately equipped for both passenger, cattle, or cargo carrying, and has engines of the triple-expansion type of latest design and large boiler power. The vessel has been designed and superintended for the owners by Mr. Wotherspoon, assisted by Messrs. Weir, Talboys, & Wyles. Messrs. Scott & Co. have recently secured the contracts for two other steamers of large size, one for foreign owners, and the other for a firm of owners in Hull.

Messrs. J. Duthie & Co., Aberdeen, have lately received an order from Mr. C. Moreley, of Waterford, to build six steel steam trawlers, each of about 170 tons gross. This firm has prospects of further orders—principally for trawlers—sufficient to keep them busy during the whole of the year about to be entered upon.

The negotiations which have for some time been in progress between Messrs. Cochran & Co., the well-known engineers and launch builders of Birkenhead, and the representatives of Mr. Mackenzie, of Newbie, for a site at the mouth of the river Arran, on which to erect new shipbuilding and engineering works, have now been satisfactorily concluded, and the purchasers have entered into possession of the ground. The site selected is practically the harbour at the mouth of the Arran, and opens directly upon the Solway Firth. The Board of Trade have granted powers to the harbour trustees to erect its harbour into a public port, and already a considerable amount of shipping is being done. Messrs. Cochran, it is believed, purpose removing their entire plant from Birkenhead, and building premises to accommodate it, as well as houses for the accommodation of a large staff of workpeople. The land marked out for the works extend to 13½ acres, and during high tides ships of considerable tonnage can be launched from the yard and floated to any part in the kingdom to get fitted out with machinery, while smaller vessels can easily be dealt with by the firm, as at the present time ships of medium tonnage can load and discharge close to the site of the engineering works. A railway line already connects the site with the main line of the Glasgow and South-Western Railway system, thus affording ready means for the delivery of coal and iron at the works from North of England or other districts.

The promoters of the Kilpatrick dock scheme, after a lengthened correspondence with the Clyde Trust, in which they have urged the necessity for the Trust aiding in the project, have resolved to delay proceeding with the scheme in this next session of Parliament. They are still, of course, of the opinion that a dock with convenient and ample storage ground at Kilpatrick is needed for the better accommodation of the trade of Lanarkshire and Dumbartonshire, but in recognition of the concessions which the Clyde trustees have intimated they will make in connection with existing docks, the promoters have resolved on delay so as to give ample time to ascertain the effect of such concessions.

Leith Dock Commissioners have come to a happy compromise on the question as to whether they should at once extend the area of the wet dock, which has been under construction since 1893, or to carry out the work to its original limits only, with the probability of having, within a period of ten or twelve years, to compulsorily go in for extension at a very much greater proportionate outlay. At a meeting of the Commissioners, held on the 10th ult., a joint committee recommended that provision should be made in the eastern wall for a passage being easily formed for an extension if necessary at any future time. This was agreed to. In previous reports and discussions it had transpired that the proposed extension by itself could be made for between £80,000 and £95,000, but that if extensions should be agreed upon as necessary, it would be better and cheaper to carry it out as part of the present works, as about £25,000 would be saved thereby. Some members thought that the new dock as presently arranged for would be good for ten years further requirements. The cost of the extension in the end would come to £110,000. There would have to be paid during the ten years £46,000 in interest and sinking fund, and £12,000 would be lost by delaying the opening of the new dock one year, or in other words there would be a loss of £58,000. In view of these facts it was not to be wondered at that the matter should have been remitted to a joint committee to report their recommendation, and its adoption probably form as happy a finding as could have been arrived at.

The Harbour Commissioners of Bo'ness, at their last meeting, remitted to their engineers and Mr. Carlow, a railway member of the Board, to confer as to having the electric light introduced at Bo'ness harbour and docks. In connection with this project, which in the meantime involves the erection of 20 lamps, the engineers, Messrs. Meek & Son, Edinburgh, have, it is understood, purchased the double-engine dynamos and electric plant which were recently used in the Public Library at Edinburgh.

On the subject of special steels for ship and boiler construction Mr. F. W. Paul, in his recent presidential address before the West of Scotland Iron and Steel Institute, made some remarks of considerable interest to all concerned in the practical development of ship and boiler construction. There was, he said, a steadily-increasing demand for higher grades of steel to comply with the following tests for shipbuilding:—Tensile strain, 38 to 43 tons per square inch; extension, 15 per cent. on 8 in.; bends, cold and tempered, to bend to a radius of three times the thickness of the plate. These conditions were equal to what was required in nickel-steel plates, and as the cost of plates of equal quality without nickel was lower, coupled with the ease and certainty of assuring perfectly clean surfaces, Governmental authorities and shipbuilders were now principally stipulating for this class of steel plates instead of nickel-steel for construction of torpedo boats and similar light craft. As an indication of what was being done in this direction, he enumerated tests of normal ½-inch plates, which had lately been manufactured by the Steel Co. of Scotland, viz.:—Breaking strain, 58·1 tons per square inch; elastic limit, 39·5 tons per square inch; elongation in 8 in., 13·0 per cent.; contraction of area, 35·0 per cent. Referring to boiler construction, he said that there had lately declared itself a disposition to use boiler shell-plates of a higher tensile strength than previously, some requirements being as high as 35 tons per square inch. For such purposes considerably greater care was demanded in the manufacture of the ingots as compared with softer quality, and it was also essential that the strictest attention should be given to the degree of heat to which the slabs were heated, the amount of work put on in rolling, and also the heat of the plate when the rolling operation was nearly completed. Mr. Paul expressed himself as decidedly of opinion that shell-plates even of greater tensile strength than that above referred to could be made with equal degree of safety—just as in the manufacture of higher grade steel for gun-barrels, tyres, &c.—but such plates would require special treatment. The commercial necessity of plate-mills producing large makes, the keen competition in cutting down prices, were potent factors in adding to the risk attaching to the output of such material. It was to be regretted, in the interests of all concerned, that some means could not be devised

for fixing a minimum price for high-class boiler plates such as would recoup the manufacturer, and so avoid the risk of sacrificing quality to quantity.

At the annual dinner of the Glasgow University Engineering Society on the 13th ult., Mr. James Dunn, late Naval Constructor, in replying to the toast of his health, gave a popular and most interesting sketch of what was involved in the way of science, art, and industry in building a modern battleship, and in producing the guns with which she is equipped. Referring to the educational facilities with which such a noble University of Glasgow ought to be fully provided, he said that students in naval architecture had not yet been furnished with means for obtaining, with the aid of model experiments, the most efficient forms for propulsion, or to determine the exact measure of power to secure a given speed. He then referred to the British Admiralty tank at Gosport, which, he said, had proved to be of enormous value, and also to the tank which forms one of the most important branches in the designing department of Messrs. Denny's yard at Dumbarton. "Our American friends," said Mr. Dunn, "are erecting a similar tank at Washington, and another at the Cornell University," and, added he, "they should never cease their troubling until the great University of Glasgow secured for its students such a desideratum."

The grand aggregate of shipping tonnage turned out from the Clyde and other Scottish shipbuilding districts—the Forth, the Tay, and the Dee—during 1897 amounts to 371,745 tons gross, as compared with 438,984 tons in 1896. The figures will be readily understood from the following abstract :—

	Sailing Vessels.		Steamers.		1897. Total Tons.	1896. Total Tons.
	V.	Tons.	V.	Tons.		
Clyde	89	40,657	229	299,380	340,037	420,841
Forth	12	1,480	18	11 755	13,235	8,650
Tay	—	—	18	13,124	13,124	4,364
Dee	—	—	17	6,349	5,349	5,069
	100	42,137	282	330,608	371,745	438,984

The output of Clyde shipbuilders amounts to slightly over 340,000 tons gross (or tons displacement in the case of war-ships). This result is short, by about 79,800 tons, of the output for last year, which reached 420,840 tons, and also of that for the year previous, which amounted to 360,150, by about 20,000 tons. The present aggregate, however, is over, rather than under, the average output during the past ten years. While 1897, therefore, has not proved the record year, as regards output, which at one time appeared highly probable, it must be said that it shows wonderfully well, all things considered. The drop from last year's and the previous year's figure is no doubt largely due to the engineering trouble, but as many vessels still on the stocks are at that stage when only a short period of active work is required to complete them for launching, and under other and happier circumstances doubtless they would have been launched —the shrinkage is perhaps not so significant of dislocation and stoppage as it might be made to appear.

The following is a summary of the output of the several Clyde firms, together with the I.H.P. of the engines fitted to the steamers. Also—for the sake of comparison—the output of tonnage for the year 1896. The details of each firm's work will be found amongst the returns given in tabular form on other pages. From this list it will be seen that many of the Clyde firms, whose output last year was large, furnish this year only modest totals. Thus, the London and Glasgow Co., Govan, who last year produced 32,220 tons, are only to be credited this year with a figure which barely amounts to one-fourth of this total, viz., 7,864 tons. In this case, however, the Government cruiser and gunboats on hand account to some extent for the diminished output. For the same reason, viz., the high-class and elaborate Government work on hand, the Fairfield output this year is exceptionally low, being only 10,966 tons, or little more than one-third their last year's output. The Clydebank firm, on the contrary, have more than doubled their output of last year, the present total reaching 23,120 tons, which is largely made up of high-class war vessels. Other firms whose output has shrunk remarkably are :—Messrs. Barclay, Curle & Co., Whiteinch, whose figures last year were 25,223 tons, and this year 5,310 tons, although a 6,000-ton Cape liner is all but ready for launching; Messrs. Scott & Co., Greenock, last year, 18,638 tons, this year, 5,600 tons; Messrs. Wm. Hamilton & Co., Port-Glasgow, last year, 15,855 tons; this year, 5,600 tons; Messrs. D. & W. Henderson, Partick, last year, 28,080 tons, this year, 22,287 tons; Messrs. Chas. Connell & Co., last year, 40,364 tons, this year, 27,583 tons; Messrs. Stephen & Sons, last year, 35,185 tons, this year, 21,379 tons; Messrs. Denny & Bros., Dumbarton, last year, 32,677 tons, this year, 25,120 tons; Messrs. Caird & Co., Greenock, last year, 20,842 tons, this year, 15,824 tons—a figure which has been made up by two vessels alone, the splendid P. & O. liners *Egypt* and *Arabia*, each of 7,912 tons and 10,000 H. P.

	Sailing Vessels.		Steamers.		1897. Total Tons.	1896. Total Tons.
	V.	Tons.	V.	Tons.		
Russell & Co.	1	1,637	20	41,275	42,912	29,116
C. Connell & Co. ...	—	—	5	27,483	27,483	40,864
Wm. Denny & Bros. ...	13	5,385	14	19,735	25,120	32,677
Clydebank Co.	20	7,200	7	15,920	23.120	10,492
D. & W. Henderson & Co.	1	75	4	22,312	22,387	28,081
A. Stephen & Sons ...	—	—	4	21,379	21,379	35,185
Napier, Shanks, & Bell ...	—	—	3	17,365	17,365	1,861
Caird & Co.	—	—	2	15,824	15,824	20,842
A. Rodger & Co.	2	3,575	6	11,961	15,536	11,504
R. Napier & Sons ...	—	—	6	13,660	13,660	12,100
Fairfield Co.	—	—	5	10,966	10,966	29,987
A. M'Millan & Son ...	—	—	11	10,826	10,826	12,450
London & Glasgow Co. ...	—	—	2	7,864	7,864	23,221
Simons & Co.	—	—	7	7,370	7,370	8,260
Alley & M'Lellan ...	21	6,867	1	749	7,316	3,300
Mackie & Thomson ...	—	—	36	6,077	6,307	7,468
Wm. Hamilton & Co. ...	2	4,000	1	1,600	5.600	15,855
Scott & Co.	2	4,860	1	590	5,450	18,638
Barclay, Curle & Co. ...	—	—	2	5,310	5,310	25,223
Fleming & Ferguson ...	1	1,400	8	3,850	5,250	6,000
Carmichael, Maclean & Co.	2	240	7	4,760	5,000	126
R. Duncan & Co. ...	1	1,985	2	3,006	4,991	2,677
Campbeltown Co. ...	—	—	3	4,596	4,596	4 385
Ailsa Company	—	—	9	4,593	4,593	4 943
Ritchie, Graham & Milne	10	1,170	9	1,681	2,851	1,593
Lobnitz & Co.	3	350	6	2,472	2,822	8,479
Murdoch and Murray ...	—	—	5	2,558	2,558	3 221
A. & J. Inglis	—	—	2	2,420	2,420	5,033
Scott & Sons	—	—	4	2,269	2,269	2,607
J. Fullerton & Co. ...	—	—	6	1,821	1,821	1,864
J. Shearer & Son ...	—	—	3	1,576	1,576	692
J. M'Arthur & Co. ...	2	408	6	1,148	1,556	536
Blackwood & Gordon ...	—	—	1	1,278	1,278	2,425
D. J. Dunlop & Co. ...	—	—	3	1,050	1,050	3,010
S. M'Knight & Co. ...	—	—	2	823	823	660
Chalmers & M'Kivett ...	4	580	1	145	725	210
D. M. Cumming	3	150	5	541	691	—
T. B. Seath & Co. ...	1	396	4	209	605	687
Jno. Reid & Co.	—	—	3	401	401	3,911
J. & J. Hay	—	—	2	220	220	210
Wm. Fife & Son	—	179	—	—	179	141
Burrell & Son	—	—	1	97	97	—
Minor Firms	—	200	—	100	300	307
	89	40,657	229	299,380	340,067	420,841

Amongst firms who have bettered their output of last year are Messrs. Russell & Co., Port-Glasgow, who have this year 42,912 tons to their credit, whilst last year the figure was 29,116 tons; and Messrs. Napier, Shanks & Bell, who from the insignificant output last year of 1,860 tons, have leapt this year into seventh place on the list with 17,365 tons, made up of three steamers, all for Japan.

Approaching 83,000 tons, or close upon one-fourth of the total output, has been tonnage built to foreign account, a fact which is of decided interest in view of the fears so presistently expressed as to the competition of other shipbuilding nations with Britain for foreign work. Japan herself appropriates exactly one-half of the tonnage to foreign account.

A remarkable feature of the year's work on the Clyde has been the immense number and great size of light-draught steamers, barges, and similar craft shipped abroad in pieces. Work of this nature amounted to over 30,000 tons, Russia alone being pro-

vided with as many as 55 barges, aggregating about 18,000 tons. India and South Africa also took a fair amount of such shipping, and altogether this year's productions in this line may be taken as indicating the activity in commerical pioneering enterprise in various parts of the world.

The aggregate, as usual, is made up of work of a highly diversified character. It includes, of course, large ocean mail and passenger steamships, of which representative examples are the *Carisbrooke Castle* for the Castle Packet Line to the Cape, and the splendid ships *Egypt* and *Arabia* for the P. & O. service to the East; also a large number of heavy deadweight carriers for a variety of ocean services. It also includes a number of fast Channel passenger steamers, both paddle and twin-screw, notable amongst which were the *Brighton Queen* by the Clyde Bank Co.; the *Empress Queen* by the Fairfield Co. (the latter for the Isle of Man Steam Packet Co., and the most powerful paddle steamer afloat—we illustrated in our August number); and the twin-screw steamer *Cambria*, built by Messrs. Denny Bros., Dumbarton, for the Holyhead and Dublin service of the London and North-Western Railway Co. It embraces naval ships, as exemplified by the first-class cruiser *Europa*, produced at Clydebank, and by the torpedo-boat destroyers launched both at Clydebank and Fairfield; palatial steam yachts, represented by the *Nahma*, built at Clydebank for Mr. Goelet, the American millionaire, and by the *Evona*, launched by the Ailsa Co. for Mr. Menzies, of Ripon; also the usual number of hopper and sand-pump dredgers, barges, &c., steam trawlers and fleeters, and paddle and screw tugs, launches, &c.

In the table just given in this account the "sailing vessels" given as built on the Clyde number 89, and on the Forth 12, but this, it should be explained, is arrived at by lumping barges, and all other crafts not propelled by machinery, under the sailing ship category. This is, of course, a convenient classification, but without explanation it might be apt to convey a very erroneous impression of the extent to which sailing tonnage still takes its place with that of steam.

Sailing tonnage proper only amounts to a little over 16,000 tons, and consisted of eight sailing ships, all built in the Greenock and Port-Glasgow district.

The marine engineering work on the Clyde has, of course, suffered considerably during the last three months of the year from the strike and lock-out, but that the decrease in output is not greater than shown by the returns is matter for surprise. Clyde engineers produced engines representing 373,195 I.H.P., as compared with 426,759 I.H.P. last year; 363,490 in 1895, and 295,620 in 1894. A lot of the work, however, was well under way when the stoppage took place, and with the aid of non-society men and apprentices—whose working of the machine-tools has been a matter of credit and astonishment—its completion proved comparatively easy. Subjoined is an abstract of the returns, both from firms who make engines for their own ships only, and from firms who do not build ships for the engines they make, but work for all and sundry. The three highest firms on the list are precisely those who appeared at the top of the list last year, and the Clydebank output on this occasion overtops all previous records. The other firms take up pretty much their customary positions, but where there is any abnormal drop this is due to the strike:—

	1897. I.H.P.	1896. I.H.P.
Clydebank Co.	55,300	56,850
W. Denny & Co.	40,500	44,000
Fairfield Co.	39,200	35,650
Dunsmuir & Jackson	22,050	14,265
Muir & Houston	20,200	20,350
Caird & Co.	20,000	22,500
*D. Rowan & Son	16,100	20,820
Barclay, Curle & Co.	15,300	15,500
D. & W. Henderson	15,000	20,360
A. Stephen & Son	12,600	25,380
J G. Kincaid & Co.	11,740	8,680
Simons & Co.	10,600	9,425
R. Napier & Sons	10,350	10,100
Rankin & Blackmore	10,100	5,190
Lobnitz & Co.	9,325	12,350
Hutson & Son	8,600	4,400
Fleming & Ferguson	8,300	9,700
Hall-Brown, Buttery & Co.	7,450	4,125
London & Glasgow Co.	7,000	28,150
Ross & Duncan	7,000	10,800
Blackwood & Gordon	6,500	5,000
Bow, M'Lachlan & Co.	5,960	12,080
A. & J. Inglis	4,600	11,820
M'Kie & Baxter	1,850	570
Shanks, Morrice & Co.	1,795	—
Lees, Anderson & Co.	1,505	—
D. J. Dunlop & Co.	1,500	5,100
Scott & Co.	1,000	15,000
Campbell & Calderwood	840	665
Alley & M'Lellan	600	4,000
Fisher & Co.	130	—
Minor firms	200	229
	373,195	426,759

* The total here is returned "I.H.P." at sea.

Messrs. James Howden & Co., Scotland Street, Glasgow, who do not now make complete engines, booked contracts during the year for the application of their well known system of forced draught, to 108 large steamers, having an aggregate I.H.P. of 301,200. When the contracts now in hand are completed the system will have been applied to boilers, supplying steam for 1,640,700 I.H.P.; the total number of installations being 655, and the power of some being as high as 30,000 I.H.P.

The output of tonnage from rivers in Scotland, other than the Clyde, shows, in every case, an advance on the previous year's results. Forth shipbuilders launched thirty vessels of 13,235 tons, as compared with twenty-two vessels of 8,650 tons last year, 16,757 tons in 1895, 15,362 tons in 1894, 13,492 tons in 1893, and 34,641 tons in 1892. The present year's output, therefore, falls far below the average for the past six years. The following is an abstract of the several firms' work, the details of which will be found amongst our tabular returns:—

	Sail. V'sels. Ves.	Sail. V'sels. Tons.	Steamers. Ves.	Steamers. Tons.	1897. Tons.	1896. Tons.
Ramage & Ferguson	—	—	9	4,543	4,543	2,101
Scott & Co.	—	—	2	3,685	3,685	3,386
Grangemouth Dockyard Co.	1	500	3	2,407	2,907	1,508
Cumming & Ellis	5	420	2	750	1,170	380
Hawthorns & Co.	6	560	2	370	930	1,125
Cran & Co.	—	—	—	—	—	150
	12	1,480	18	11,755	13,235	8,650

Messrs. Cran & Co., Leith, while building no more vessels, carried out during the year extensive repairs to vessels in dry dock, and completed five sets of engines, aggregating 1,750 I.H.P., all of the compound surface-condensing type. Messrs. S. & H. Morton, Leith, besides doing a number of repairs, fitted the steamer *Amulet*, of Messrs. Gibson & Co.'s fleet, with new triple-expansion engines, indicating 1,500 H.P. Messrs. Menzies & Co., Leith, executed a large number of repairs, including several orders from the Admiralty. They have now added to their establishment an engineering department, with machinery of the latest type.

On the Tay, both shipbuilding and marine engineering have enjoyed a run of activity which has not been equalled since 1892, where the vessels launched represented 22,299 tons. The total for 1897 is 18 vessels of 13,126 tons, as compared with 7 of 4,364 tons last year. The following is a summary of the returns:—

	Vessels.	1897. Steamers. Tons.	1896. Tons.
Gourlay Bros. & Co.	7	7,644	2,774
Caledon Co.	5	4,162	1,200
Dundee Co.	6	1,318	390
	18	13,124	4,394

As regards marine engineering, Messrs. Gourlay Bros. & Co. produced nine sets of engines of a total N.H.P. of 1,209;

the Caledon Co. give sets of a total N.H.P. of 4,240; Messrs. Cooper & Greig, three sets of a N.H.P. of 140; and Messrs. James Carmichael & Co., Limited, two sets of a total N.H.P. of 105.

The shipbuilding yards at Aberdeen on the Dee have, like those in Dundee, been plentifully employed in comparison with many previous years, and the prospects for 1898 are correspondingly bright. The following is an abstract of the returns:—

	1897. Steamers.	Tons.		1896. Tons.
Hall, Russell & Co.	7	3,795	...	2,992
Alex. Hall & Co.	5	794	...	875
J. Duthie & Son	5	760	...	1,202
	17	5,349		5,069

Messrs. Hall, Russell & Co. have on hand seven vessels aggregating 8,092 tons, one of which is of the substantial tonnage of 4,500 tons, for Messrs. Thompson & Co., Aberdeen. During the year the firm constructed all the engines for the vessels built by themselves, and in addition five sets of compound engines, 300 I.H.P. each, for Messrs. John Duthie & Sons, Aberdeen.

As regards work in hand in the several Scottish districts, this must be said to be highly satisfactory, and doubtless should a termination be put to the most deplorable dispute which has undoubtedly wrought much evil in diverting work away from our shores—for the time being at any rate—important contracts will continue to be forthcoming. In Clyde yards the work on hand represents close on 386,000 tons, and a great deal also remains to be done on new vessels detained in dock through the strike. At Leith, Dundee, and Aberdeen, as already noted, a gratifying amount of work is under way, and altogether during the coming twelve months work should be most plentiful, and it is most devoutly to be hoped that labour disorganisation may not militate against this.

TRADE NOTES FROM THE TYNE, WEAR TEES, HARTLEPOOLS, &c.

(From our own Correspondent.)

THE year 1897 commenced with a somewhat marked falling off of business in the shipbuilding trade, as compared with the state of matters in the last quarter of the year preceding. It would seem that a sort of false estimate of the future had been formed by many shipowners, in the autumn of 1896, a temporary rise in freights filling them with the belief that the time for making profits and reimbursing themselves for past losses had come at last, and they accordingly began to place orders for new tonnage with some haste. This went on, as we have indicated, for the short term of only three months, but in the time most of the leading shipbuilding firms booked as many orders as practically secured them against any possibility of slackness in their yards for a very long time ahead. With the advent of the New Year, however, freights again showed signs of reverting to the abnormally low figures which ruled six months before, and this movement in shipping had the immediate effect of checking speculative enterprise in building. Very few orders were booked therefore in the succeeding spring months, and then came on the trouble in the engineering trade, which has had the effect of further crippling enterprise. To this latter cause must be attributed the falling off in the country's output of tonnage, as compared with 1896, the output totals for the two years being, 1,122,824 tons and 1,391,249 tons respectively. The fact that the construction of vessels has been purposely delayed by builders, in view of the impossibility of getting engines for them while the dispute lasted, has caused a good deal of enforced idleness among the shipbuilding operatives; so much so indeed that the monthly outlay of the Boilermakers' and Iron Shipbuilders' Society, in the payment of "home donation," has been nearly doubled. The delay, of course, will tell beneficially on trade when the engineering dispute has been settled; for the work of uncompleted vessels on the stocks will have to be proceeded with at as high a rate of speed as may be practicable. This work may be regarded in the light of arrears, and there will be in addition current orders to go on with, so that an exceedingly busy time, in the majority of yards, may be looked forward to, when the engineering dispute is at an end.

So far as regards the shipbuilding operatives themselves, the work of the yards has been very little interrupted by wages disputes during 1897, and the officials of the great trade union just referred to may be congratulated on the fact that their expenditure for strike payments is practically *nil*. This is very remarkable, considering that the membership of the union is over 40,000, and that the majority of the members are as little remarkable for docility as those of any other trade union. The singular immunity from strike troubles enjoyed by this society is, we believe, attributable to two causes, namely, the readiness and universality with which the power of the society is recognised, and the foresight of the officials in devising means for the pacific settlement of wages difficulties. The only labour disturbance of any consequence that took place in shipbuilding during the year was a demarcation dispute, in which the drillers and a section of the trade union before referred to were involved. This was expected to lead to very serious and widespread trouble; but through the initiative of the union leaders themselves, the question of apportioning the disputed work between the two parties interested was left to the employers, and thus in the most rational and legitimate manner this trouble was got rid of. What a satisfaction it would be if all sections of workers would recognise, with equal readiness, that in all demarcation disputes the employers ought necessarily to constitute the final court of reference.

Subsequently to the drillers' and caulkers' dispute being adjudicated upon by the employers, the former body made application to be incorporated with the Boilermakers' and Iron Shipbuilders' Society, of which the caulkers are a section. The executive council of the latter union strenuously advocated the admission of the drillers, but the members of the Liverpool branches of the society took the opposite view, and when the matter came to be voted upon, the latter carried their point by a very large majority. Thus a decisive step in the direction of federation was promptly arrested by the vote of a body of trade unionists acting in direct opposition to the advice of their executive.

In the adoption of labour-saving appliances there does not seem to have been much done in the course of the year, the principals of the big establishments being apparently of the opinion that they have accomplished as much as is practicable in the direction referred to. Certainly, if things are to be compared to what existed 30 years ago, when templates were scarcely known, and every plate and bar entering into the structure of a vessel had to be temporarily fixed in its place for marking, enormous strides have been made. Still there is much labour of an exceptionally severe kind done by hand, and we do not think that even the bitterest opponent of labour-saving machinery will find much fault when an apparatus is devised for rivetting the hulls of vessels. In most yards the frames and beams of vessels are now rivetted by hydraulic machines, but that seems to be about as far as any firm seems disposed to go. We do not for a moment believe that the difficulties in the way of applying a system of machine rivetting throughout are insurmountable, and we believe the problem would have been solved ere now had the rivetters developed a mania for going on strike. It is, indeed, the remarkable immunity from wages disputes of this class—attributable, no doubt, to causes before referred to—that has, in a sense, kept in abeyance the further development of machine rivetting.

The utilization of electrical power, and the novel arrangements for its transmission, that are now to be witnessed at some of our shipyards, point distinctly to further impending changes in the machinery equipment of shipbuilding works. When the science of electrical transmission is better understood, we have little doubt that much of the very laborious work in the construction of ships will be done by means of the electric current.

During 1897 the tendency to replace boats that were lost or sold or had become valueless for the purpose of sea voyaging, by vessels of a much larger size, became distinctly more noticeable, and vessels have been laid down that, in point of cargo-carrying capacity, are far in advance of anything previously attempted. One of the very largest—the *Algoa*—was launched by Messrs. Doxford, of Sunderland, early in the year, and some weeks previous to the launch another vessel of great size was laid down at the yard of Sir James Laing. Messrs. C. S. Swan & Hunter, of Wallsend, launched one or two exceptionally large steamers during the year, and have also the distinction of launching the largest pontoon dock ever made. This firm have besides, the high distinction of taking second place in the world's output returns of tonnage launched in 1897, their figure being

48,570 tons, which is an advance upon their 1896 achievement of nearly 9,000 tons.

The shipbuilding orders from foreign countries executed on the North East Coast in the year just closed, though not so numerous as in former years, were still sufficient to make a good proportion of the total output, and were in all cases of a very special and interesting kind. However unpleasant it may appear, we must begin to recognise the fact that foreign countries are learning to rely more upon their own resources than was formerly the case, and that in shipbuilding, as in other matters, we must not expect so large a share of their custom in future. If we we can produce better work in less time, and at a less cost than they can do, we may still have a chance of getting a share of their contracts, and the chance will be in exact proportion to the extent to which we can make it worth their while to come to us. To keep and cultivate the foreign trade, our employers of labour must have a free hand in the management of their works and of the men they employ, and our workmen must realize that regular work at good wages is of much greater importance to them than any impracticable and impossible scheme for lessening the hours of labour.

While a few of the leading North-East Coast firms have increased outputs to show for 1897, the majority are in the opposite scale, the reduction, in some cases, being somewhat startling. Messrs. Ropner, for instance, have fallen from 40,260 tons in 1896 to 22,578 tons in 1897. Equally remarkable is the case of Messrs. Furness, Withy & Co., who, in 1896, launched 31,603 tons, but, in 1897, could only compass 16,235. There are, doubtless, special reasons for the reduction in these cases, as it is well known that the firms named do not lack enterprise, nor are their establishments in the least degree behind others of the first rank in the matter of machinery equipment.

During the year the graving dock accommodation of the district has been increased by the opening of a large and admirably-equipped dock at Blyth. This dock is 430 ft. long, and is the third possessed by the Blyth Dry Dock Co., Limited, who will now be able to undertake the repair of vessels of the very largest class.

THE TYNE.

Shipbuilding.—Owing to the impossibility of finding full work for all the men employed, several of the leading firms on the Tyne have temporarily resorted to short time. This step, of course, has been rendered necessary by the continuance of the dispute in the engineering trade, and it must be regarded as a much more humane measure than total stoppage, or the discharge of a portion of the hands. An important announcement has been made to the effect that a well-known electrical engineering firm has secured an extensive piece of ground, adjacent to Messrs. C. S. Swan & Hunter's yard, Wallsend, on which to erect premises suitable for shipbuilding and engine-building purposes. A commencement has already been made with the laying-out of the ground and other preparatory work, and it is probable that this important addition to the industrial establishments of Tyneside will be in full swing by the end of 1898.

The three yards of Messrs. C. S. Swan & Hunter—that is to say, the two shipyards and the pontoon yard—are very fully supplied with work. In the east yard, where the berths are covered in, three vessels of exceptional size and superior type are in course of construction; while in the west yard there are also three vessels on the stocks, the initiatory work of a large floating dock being in progress in the pontoon yard.

Messrs. Armstrong, Whitworth & Co.'s yards at Elswick and Low Walker are about as busy as it is possible for any shipbuilding establishments to be in the peculiar circumstances now affecting the industry. There are war vessels in progress at both places, and at the last-mentioned yard there are two oil-carrying steamers building, of somewhat novel design. In view of the fact that most, if not all, of the vessels are far in advance of the machinery that is being constructed for them on the Tyne and elsewhere, nothing approaching to pressure is being used in proceeding with contracts.

Messrs. Wigham Richardson & Co., have received from the Russian Steam Navigation Co. an order for two 5,000-ton steamers, one of which will be built at the firms, own yard, and one at the yard of Messrs. W. Dobson & Co. The machinery for both will be constructed by Messrs. Richardson, at their well-known Neptune Engine Works, Low Walker. Both the firms named have other work in progress and in preparation, and will doubtless be very busily employed in the coming year.

Messrs. Hawthorn, Leslie & Co. have received from Messrs. Turnbull & Martin, London, an order for two large vessels to be employed in the dead-meat trade, and have also contracted to build a number of fishing vessels. The firm's large graving dock has been constantly occupied during the past year, the overhauling of the Russian steamer *Orel*, being the most important contract dealt with in the time. The construction of the torpedo destroyers which the firm are building to the order of the Admiralty is being proceeded with very steadily, rapidity of execution not being specially desirable in this class of work.

At Messrs. Robt. Stephenson & Co.'s yard a considerable degree of activity is being manifested, the greater proportion of the work in hand being of the pontoon order, and consequently not so liable to be retarded by the complications in the engineering trade as is ordinary shipbuilding work.

The Palmer Co. have a large amount of work in hand, though up to the present it would seem that they are finding the resources of their Jarrow yard equal to their requirements. Though this establishment is one of the oldest in the kingdom, perhaps it is not too much to say that there is none more thoroughly up to date in machinery equipment and general working arrangements. The output of 40,319 tons which has been attained in the past year may seem small in comparison with what has been done by some other leading firms: but it must be recollected that a large part of the output consisted of torpedo destroyers and cruisers; and it needs but a very elementary knowledge of shipbuilding to be able to appreciate the difficulties to be encountered in dealing with this class of work as compared with merchant ships. An interesting table has been published showing the output of the Palmer Co.'s yard each year since 1852, and it is somewhat remarkable to note that only half a dozen times in that long period has the output of 1897 been exceeded. These were the first three years, and the last three, of the last decade, the record year being 1889, when the enormous figure of 64,669 tons was attained. We believe we are correct in saying that this figure has never been exceeded, excepting by Messrs. Harland & Wolff, of Belfast.

The Tyne Iron and Shipbuilding Co. have had a successful year, and have slightly exceeded the output of last year. The fact that the firm have turned out more tonnage than many having a larger yard area at their disposal must be regarded as highly creditable to the management.

Messrs. John Readhead & Sons are as well supplied with work at the close of the year as they were at the outset; but in common with other firms they have not been able to make as active progress with contracts as they had expected to. In addition to the eight steamers of an aggregate tonnage of 23,659 tons, which the firm launched during the year, they carried out a good many repair contracts of importance, and their graving dock has seldom been unoccupied.

The three firms at Shields that are devoted to the building of fishing vessels and other small craft have been well employed during the past twelve months, and have now a good share of work in hand.

The Smith's Dock Co., North Shields, have had a full average of repair contracts during the year, and have now some important work of this class in progress. Other repairing firms are also fairly busy.

Engineering.—At all the marine engine shops there is undoubtedly an improvement since last month, the execution of contracts being carried out with such a degree of despatch as in some cases to approximate pretty closely to the normal rate of production. So successful, indeed, have some of the employers been in engaging suitable labour to man their shops in the absence of the recalcitrant engineers, that it seems as if, in the event of the strike lasting for another half-year, there will be no places left for the latter. Luckily, there is not much likelihood of the dispute lasting that time, or anything like it, for the funds of the Engineers' Society are practically exhausted, and the future dependence of the men for support must be upon the generosity of others. This is a sorry outlook for them, and they will find that it will not take long to dry up the sources of outside help. The sooner this happens the better; for then, such of them as can get work will be glad enough to return to it. Those who are for the time being assisting the engineers by loans or gifts of money to maintain a stubborn resistance to the reasonable proposals of the employers, can scarcely have realized how much mischief they are doing and how unavailingly they are prolonging the agony. Anyone of sane mind must see that the employers of the country are determined to have

the upper hand in this crisis, and that they have the means as well as the will to achieve their object. Apart altogether from the justice of the case, it is clear that the employers mean to win, and when that determination is made manifest, it is the sheerest folly for any trade union, or combination of trade unions, to resist them. We have said that the proposals of the employers are reasonable, and to put them in a nutshell they amount simply to this—that the employers in future shall have the power to manage their works in such manner as may seem best to them. The acquisition of this power by the employers involves no injustice to anyone; but offers a distinct guarantee—so far as such a guarantee may be possible—that between man and man, or, to give the phrase a more extended meaning, between labourer and mechanic, there shall be fair play. These trade unionists, who talk so glibly about the "arbitrariness," &c., of the employers, have for long enough treated the labourers with whom they are placed in contact with injustice and contumely; and it is but truth to say that in the new order of things which is now about to be inaugurated, the latter class will have a burden lifted from their shoulders, and individuals among them who have industry and merit will have what has not been possible to them during the past twenty years—a chance to rise.

The statement made in last month's Notes to the effect that Messrs. Clark, Chapman & Co. were maintaining a large weekly output of their specialities for steamship equipment, is, we regret to say, incorrect. We find, indeed, that the reverse is the case, and that the output of the firm for a considerable time past has been but a tithe of their ordinary production

Messrs. Noble & Lund, of the Northern Machine Tool Works, Felling, are utilising the present lull in business, caused by the engineering dispute, to perfect the arrangements for enlarged production, and for generally improving the working accessories of their establishment that have been in progress for some time past. The firm have plenty of orders for band saws, piston rings, and other specialities; but under present circumstances they are very far indeed from being able to make such satisfactory progress as they could wish. When the engineering dispute is settled, however, they will doubtless be enabled to at least partially make up for lost time, and not the least of their new auxiliaries to production, i.e., their iron-foundry, will be ready for a start before the new year is far advanced.

The electrical works of Messrs. J. H. Holmes & Co. are well supplied with orders, and the firm have carried out a good many important shiplighting contracts in 1897. Messrs. Holmes commenced business in the early days of electrical engineering, and since their present works were erected several extensions have been carried out, making the premises at the present time about three times as large as they were originally. Every added foot of floor area, however, has been wanted, a fact which, by itself, tells a tale of development.

THE WEAR.

Shipbuilding.—The output of tonnage on the Wear in 1897 was 181,297 tons, being about 37,000 tons less than the output of the year previous, which, it may be mentioned, was a record year, the highest figure ever attained having been reached, namely, 218,340 tons. It is universally admitted that had it not been for the trouble in the engineering trade the Wear output in the year just closed would have even exceeded the record. Messrs. J. L. Thompson & Sons head the list in the output returns for 1897, Messrs. Doxford and Messrs. Short Brothers running almost neck and neck for second place. The seven "turret" steamers launched by Messrs. Doxford during the year were all of large size, four of them being additions to the well-known "Clan" line of steamers. The merits of the "turret" design are now too well known to make any lengthened reference to the subject necessary; but it is certainly a matter on which the firm may be congratulated, that some of the most noted owners are coming to them with their orders.

The fact that Messrs. Short Bros. have been able to put off over 30,000 tons in the twelve months, from no more than four building berths, speaks volumes for the energetic manner in which the business of the establishment is carried on. For one thing, the firm are practically free from trade-union interference, and they are the only shipbuilding firm of note of whom this can be said. Piecework, too, is very largely used in the yard—much more so, indeed, than in other shipbuilding concerns, as not only are the platers, rivetters, and caulkers paid by results, but also the helpers, who work with the first named.

Among the vessels built by Messrs. J. L. Thompson & Sons, during the year, were the Japanese steamer *Tai-Nan*, the German-owned *Luciana*, and the *Port Victoria*, built to the order of a well-known English company. It is no disparagement to the other steamers turned out by the firm to say that these three—and especially the first named—were very notable achievements in shipbuilding. At the time of writing the firm have all their berths occupied, and considering the impediments in the way of pushing on work, by reason of the partial stoppage in a kindred industry, they have a very considerable force of men employed.

Sir James Laing has not come up well in the returns this year and the circumstance is not easy to account for, seeing that there was no lack of orders, and his yards at Deptford are not behind the age in the matter of appliances. The explanation may perhaps lie in the circumstance that the vessels built at the Deptford establishment were mostly of special type, but upon this point we are not in a position to speak positively. In addition to the new work turned out there has been a large amount of repair work dealt with.

Messrs. Robt. Thompson & Sons have been well off for work during the year—especially in the latter part, and they are commencing the New Year with the whole of their berths occupied, the vessels in hand being all of good size. The firm have carried out some important improvements at their Bridge Dock, and have achieved distinction by being the first to apply electrical power to the pumping machinery of graving docks. As under new arrangements, vessels can be docked and undocked very much more rapidly than formerly, there is little reason to doubt that the accommodation of the dock will, henceforward, be very largely resorted to.

Of the five steamers built by Messrs. Priestman during the year, one was of the "self-trimmer" design, introduced by the builders. This firm's output of 12,660 tons stands in marked contrast to the output of other Wearside firms of apparently no greater productive power, and yet is very satisfactory when compared with the achievements of many firms at other centres of the trade.

Messrs. Bartram & Sons, who have only two building berths, succeeded in launching 10,628 tons during the year, and have two vessels of 3,200 tons each on the stocks, which would have been out into the water had it not been for the engineering dispute. This would have made an output of over 17,000 tons, which, for a yard of two berths, would have been a remarkable achievement.

Messrs. Blumer & Messrs. Austin launched four vessels each in 1897, the respective total of tonnage being 10,868 and 7,075. Both firms have had repair work to deal with, but the last named have put a very large quantity through their hands. This firm are still exceedingly busy with repair work, and have three vessels in course of construction on the stocks.

Messrs. Osborne & Graham and the Strand Shipbuilding Co. have each launched but one vessel during the year, but both firms have recently booked orders, and there is reason to believe that they will do much better in the year that is now commencing. The last named have had a good deal of repair work.

Engineering.—The North-Eastern Engineering Co. have not had a large output of marine work during the past year, but, in addition to the matter that is retarding business with all other firms—or, at all events, with most—this firm have had a very important contract in hand for the Vauxhall Waterworks, London, and the hands employed have been largely occupied on this.

At the Palmer's Hill Works business has proceeded very steadily during the past month, the staff of hands having been augmented by the addition of a few non-union workmen. The demand for Dickinson's patent crank shaft is well sustained, and the output of this speciality in 1897 has, considering all things, been very satisfactory. The Southwick Engine Works are going very nearly at the normal rate, various departments being practically full-handed; and at Messrs. Doxford's engine works there are certainly more signs of animation than were to be witnessed a few weeks ago. In the two non-federated shops—Messrs. Wm. Allan & Co.'s and Messrs. Maccoll and Pollock's—work is very plentiful, and the machinery is kept going night and day. The former have, in addition to orders from various shipbuilders on the Wear, a contract to supply the engines for a vessel building at Stockton.

Messrs. John Lynn & Co. continue busy in all departments of their works, including the new foundry; and Rays' forge, in the

immediate vicinity, is well supplied with work. The Bloomfield Engine Works (Mr. A. A. Rickaby) continue fairly busy, and at the Monk Street foundry, Monkwearmouth, the outlook has improved. Local iron works are kept in steady operation; but excepting in the instances named, foundries are slack.

The Hartlepools.—Sir Wm. Gray & Co. are, in view of the engineering stoppage, employing their shipyard workmen in sections, accordingly as progress can be made in special departments of the works. Just now, openings have occurred for the employment of frame turners and rivetters, and considerable numbers of the latter have been put on. The employment afforded is necessarily intermittent, but it is better than none at all, and is so regarded by the men. At the local engine works very fair progress is being made with contracts, considering the limited supply of skilled labour at the command of the management. It is stated that the Mayor of Hartlepool, Mr. Thomas Mudd, of the Central Marine Engine Works, has, with a view to mitigate the prevailing distress among the labourers, offered to find employment for 50 or 100 of their number at the Central Works. We are not aware whether or not this timely offer of employment has been accepted. Timber imports are still pretty numerous, and there is consequently a fair demand for labour at the docks.

Stockton.—The yard of Messrs. Ropner & Sons is still closed, but at the establishment of Messrs. Craig, Taylor & Co. a full complement of hands are employed. Iron and steel works are busy, but there is no change at the engineering establishments.

Middlesbro'.—The workmen of Messrs. Raylton Dixon & Co. are now on short time, which seems a much better arrangement than discharging a number, and keeping the remainder at work. Steel works are fully employed, and in the docks business is fairly brisk.

Darlington.—Most of the industrial establishments at this centre are kept busy, and at the forge works contracts are plentiful.

Consett.—The state of business at the Consett Works is still active, and the output large.

THE MERSEY.

(From our own Correspondent.)

DURING the past year labour disputes have largely governed the position throughout the marine and general engineering industries. Early on the machine labour question, although not directly involving this district, had indirectly a very unsettling effect, owing to the enlarged dimensions to which this dispute threatened to extend. Scarcely had this been disposed of when the 48 hours movement was brought to the front, and during the whole of the second half of the year the bulk of the important engineering and shipbuilding firms in Lancashire have been involved in one of the most stubbornly-contested disputes of modern times. Firms in this district generally started the year with their books full of orders, and new work continued to come forward in such quantity that many of the leading establishments were unable to entertain further orders for delivery within the next six or nine months, some of the machine tool makers being full of work to keep them employed over the whole year, a good deal of this being for marine requirements, locomotive builders also secured a very large weight of work; stationary engine builders and boilermakers obtained orders sufficient to ensure full activity for some time forward, and during the first half of the year, general briskness of trade, with most encouraging prospects for the future, prevailed in every branch of engineering, except perhaps amongst some of the textile machinists. The trade unions took advantage of this activity to continue their agitation for higher wages, which had been so generally successful towards the close of the previous year, and in various districts where it had not already been conceded the 2s. advance was secured with but little real opposition from the employers, except at Oldham, where a nine weeks' strike took place before the employers practically gave in to the workmen's demands. At this period the employment returns of the trade unions amply testified to the activity prevailing, and in the last report, issued prior to the commencement of the lock-out, the number of out-of-work members on the books was lower than for many years past: the Amalgamated Society of Engineers having only 1½ per cent., and the Steam Engine Makers' Society and the United Machine Workers' Association, not more than one per cent. of the membership on donation benefit. The history of the lock-out and strike which commenced in this district on the 6th July, is so well within the memory of all that only a very brief account of it is necessary. In the Lancashire district the lock-out commenced with about fifty firms posting notices, and by the end of October this number was practically trebled, and when ultimately the conditional agreement to hold a conference was come to, other notices had either been posted or were in preparation, which would in all probability have brought up the total number of firms locking out in Lancashire to very close upon 200. In the meantime firms involved in the lock-out and strike carried on their works as best they could, by the aid of foremen, apprentices, and non-union labour, but in some cases absolute stoppage became imperative—the makers of high-class machine tools being most severely handicapped. One of the most serious results of the strike has, of course, been that it has given an opportunity to foreign competitors to secure orders which would not otherwise have come into this district, many important contracts having been placed abroad owing to the inability of local firms to undertake their execution within the specified time. Establishments, however, have still plenty of orders in hand, sufficient in most cases to keep them going for some time to come, and when operations are fully resumed, the pressure to complete orders on which work has been suspended during the dispute will be such as to cause considerable activity in trade, and the most skilled workmen will be in great request. Although the trade unions have declined to accept the employers terms for settling the dispute, it is anticipated that with the turn of the year work will be resumed at the federated establishments.

The marine engineering industry of this district has necessarily suffered as in other shipbuilding centres, by the protracted lock-out and strike, as not only are all the principal marine engineering firms with perhaps one exception connected with the Employers' Federation, but the shipbuilding yards on the Mersey have also joined in the lock-out, and this has necessarily restricted the output. The following are the returns issued by Messrs. Laird Bros., of Birkenhead, who are now the only really important shipbuilders on the Mersey, and who have had a large amount of Government work in hand. During the year the firm have launched the following vessels:—*Panther*, steel twin-screw, 320 tons, triple-expansion engines 6,000 I.H.P., 30 knots, for H.M. Government; also *Seal* and *Wolf*, of same class, power and speed, for H.M. Government; *Fulton*, steel single screw, 100 tons gross register, compound engines, 150 I.H.P., 10 knots, for a foreign Government; a steel lighter vessel, of 55 tons register, for a foreign Government; *Connaught*, steel twin-screw, 3,070 tons register, triple-expansion engines, 9,000 I.H.P., 23 knots, for H.M. Government; *Presidente Sarmiente*, steel single screw, 2,352 tons, triple-expansion engines, 2,000 I.H.P., 13 knots, for a foreign Government; *Princess Alice*, steel single-screw auxiliary yacht, 1,270 tons, triple-expansion engines, 1,000 I.H.P., 12 knots, for foreign owner; H.M. *Express*, steel twin-screw, 400 gross register, triple-expansion engines, 10,000 I.H.P., 33 knots.

Last month reference was made to the launching of the new yacht built by Messrs. Laird for the Prince of Monaco. This yacht, which was christened the *Princess Alice*, and has been built mainly for scientific purposes, is to be propelled by engines of 1,000 H.P., designed to ensure a speed of 12 knots. The length between perpendiculars is 225 ft. with 24 ft. beam, a depth of 20 ft., and tonnage of 1,270 old measurement. The hull is of steel, and divided inso seven watertight compartments. The vessel will be rigged as a schooner, with yards on the foremast, and have a large spread of canvas to ensure good cruising qualities under sail. The yacht will be lighted by electricity, and will have a powerful refrigerating installation. The firm have also launched the torpedo-boat destroyer *Express*—which is larger than any destroyer hitherto built. The length is 235 ft., and she has a speed of 33 knots, which will make her the fastest vessel afloat. The increased dimensions and power of this vessel will give her a great advantage over other vessels of the same class.

In the iron trade the year opened with very encouraging prospects. Pig-iron makers were well sold over the first three months, with a strong tone in prices, and general anticipations of an early upward move, which caused both makers and

merchants to be very chary about committing themselves very far ahead. The opening prices were on the basis of 47s. 6d. to 48s. 6d. less 2½ for forge and foundry Lancashire; 44s. 6d. and 45s. to 47s. 6d. for forge and foundry, Lincolnshire; and 50s. for Derbyshire foundry, net cash, delivered Manchester; 49s. 4d. for Middlesbrough by rail, and 48s. 6d. Manchester Docks, with Eglinton and Glengarnock quoted 52s. 3d. and 52s. 6d. at docks. Lincolnshire brands especially were difficult to get, and during January makers put up their list rates 1s. per ton; similar advances were also made in Derbyshire and Middlesbrough iron, and all round prices continued to harden. The downward movement in warrants, however, towards the end of the month gave a check to this improvement, and in the face of underselling on the part of merchants, makers' quotations were not readily obtainable, but no anxiety was shown to force business at under current rates. Before the end of February, however, quite a spell of depression had set in, which for the time being forced down prices, and brought about a good deal of under quoting by merchants, with not a little of "bear" speculation in some directions. The position in the general iron-using industries scarcely warranted this fall in prices, and an opinion which found expression in many quarters was that the powerful "bear" element in the speculative markets, assisted by the recent imports of American pig-iron, had more to do with the downward course of prices than any really retrograde movement in trade, whilst no doubt the pending labour disputes and the threatening outlook abroad exercised a disquieting effect upon the market. The restriction of buying necessarily weakened makers' position, and district brands were reduced 1s. per ton, Lincolnshire foundry averaging 45s. 6d. to 46s. 6d., and Derbyshire 49s. to 50s., with forge Lincolnshire obtainable in the open market at about 44s. Middlesbrough got down to about 48s. 10d. and 49s. 4d. by rail, 48s. at docks, and Eglinton and Glengarnock to 50s. 3d. and 50s. 6d. at docks, with American foundry pig-iron offering at 47s. 6d., and forge descriptions as low as 44s. delivered Lancashire finished iron-making districts. This downward move brought forward no increased weight of business, as makers were still undersold by merchants, and prices continued to steadily weaken. The machine labour dispute and the unsettled position abroad checked buying, and with merchants cutting in to secure any business that was to be got, makers here and there who were in want of orders had to follow the market. This state of affairs continued well on into April, when business was still further disorganised by the outbreak of hostilities between Turkey and Greece, and "bear" operators were encouraged to force prices down to the very lowest point, whilst the possibility of serious developments in the immediate future, caused buyers to hold back from placing orders, except for the most pressing requirements. Lancashire pig-iron was still quoted 46s. 6d. to 48s. 6d. less 2½; Lincolnshire averaged 44s. to 45s. 6d., and Derbyshire 48s. to 49s., with merchants prepared to take considerably under these figures. Current quotations for Middlesbrough got down to 48s., and 48s. 6d., by rail Manchester; with Eglinton and Glengarnock offering at 48s. 3d. to 48s. 9d. at the docks. In the large iron-using industries activity was well maintained; and apart from outside influences it was difficult to explain so serious and retrograde a move in prices, which was of course taken advantage of by speculative operators to buy over the year at very low figures. Makers' quotations were altogether out of the market, Lincolnshire being offered by merchants at 42s. 6d. to 43s. for forge, and 44s. to 44s. 6d. for foundry, with Middlesborough readily obtainable at 47s. 4d. to 47s. 9d. by rail, and 48s. at the docks; Eglinton and Glengarnock quoted at 48d. 3d,. and American pig iron offering at 46s. at the docks. Early in May the position began to show some improvement, and at low prices a considerable business was done. Gradually the low-cut prices disappeared, a very noticeable feature being the much stronger tone in forge and foundry Lincolnshire. The Whit-week holidays and Jubilee festivities necessarily very considerably interfered with business during June and July, and it was generally anticipated that this spell of comparative inactivity would be followed by some rush of buying. The eight hours' movement in the engineering trades, with the threatened general lock-out of the principal works throughout the country checked, however, the hardening tendency that had been gradually making itself felt, and brought about a weaker tone in prices. So far as makers' quotations were concerned, these were generally well maintained, except that for Lincolnshire brands they were reduced 1s. per ton, bringing the official prices for forge to 42s. 6d., and for foundry 44s. 6d. This necessitated some informal concession on the part of Lancashire makers, whilst Derbyshire brands got down to 46s. 6d. and 47s. Quotations for Middlesbrough ranged from 47s. 7d. for G.M.B.'s to 49s. 4d. as makers' price, with Eglinton and Glengarnock 48s. 6d., and American pig-iron 47s. at the Docks. After the first unsettlement caused by the commencement of the lock-out and strike had been overcome, it was found that business was not being affected to the extent that had been anticipated, and a steadier tone supervened. It was exceptional where merchants were prepared to cut very much below current rates, whilst makers, as a rule, held steadily to their quotations. Although gradually the effects of the dispute began to make themselves felt, not only in lessened buying, but in the stoppage of deliveries on account of contracts, the position, as regards prices, was not materially affected, the steadiness with which these were maintained being a matter of general comment. One cause of this was the exceptional lowness of stocks in the hands of makers, which removed any anxiety to press sales, whilst it was also evident that notwithstanding the dispute, there was a considerable volume of trade being done throughout the country, which under ordinary conditions would undoubtedly have hed its effect in strengthening prices. During September an increasing weight of business came forward which caused a hardening up in some brands of 6d. per ton, Lincolnshire makers quoting 43s. to 45s., and 45s. 6d.; Middlesbro', 50s. 1d., by rail, and 48s. 3d. at the Docks; Glengarnock and Eglinton, 49s. to 49s. 6d., and American pig-iron, 45s. 6d. to 45s. 9d. at the Docks. Generally a healthy position was maintained, makers as a rule being indifferent about selling at current rates, but with the unexpected protraction of the engineers' dispute buying fell off. Towards the close of the year, however, the prospect of a termination of the dispute gave a stronger tone to the market, and makers prices at the time of writing are steady at about 45s. 6s and 48s. 6d. for Lancashire, less 2½; 43s. to 45s. 6d. for Lincolnshire; 47s. 6s. to 48s. 6d. for Derbyshire; 49s. to 49s. 6d. for Middlesbrough, by rail Manchester, with Eglinton 47s. 6d. to 48s., and Glengarnock 46s. 6d. to 47s. at the ports.

In the finished iron trade manufacturers also started the year with their order books well filled, and prices firm at £6 for bars; £7 5s. to £7 10s. for sheets, and £6 10s. to £6 15s. for hoops delivered Manchester district, with 2s. 6d. less for shipment. During the first two months business continued to come forward freely, and some of the makers were able to fill their books pretty well over the first six months. Buying, however, gradually began to fall off, and with merchants competing for any orders coming upon the market prices were gradually forced down, merchants becoming ready sellers of bars at about £5 15s. to £5 17s. 6d., and makers had gradually to follow the downward course of the market. During March bars got down to £5 12s. 6d. in the open market, with makers quoting £5 17s. 6d., but these did not represent the lowest prices touched, as towards the end of October, £5 10s. was being taken in the open market by merchants, and makers were sellers at under £5 12s. 6d. These low prices were no doubt to some extent brought about indirectly as a result of the stoppage of so many engineering works, but to a considerable extent the loss of home business through the above cause was replaced by an increased shipping demand, which enabled makers to get much better prices for export than on inland sales. With the close of the year the low prices brought forward a considerable amount of home trade business and a gradual hardening in prices, bars getting back to £5 12s. 6d. and £5 15s. as the minimum. In sheets and hoops, business all through the year has been extremely slow. Prices for hoops have remained constant at the association list rates, but Lancashire makers have only been able to keep their mills very partially employed, as not only has the very considerable export trade in baling hoops to the United States been almost entirely lost, but American manufacturers have become keen competitors for the South American trade, and have secured important orders at prices which Lancashire makers have not been able to touch. Sheets have gradually eased down, until they have been obtainable as low as £6 to £6 10s., but with the close they have shown some slight improvement, the leading makers £6 17s. 6d. to £7 delivered.

In the steel trade the year also opened with a hardening in

prices, with hematites firm at about 59s. to 60s. less 2½; billets, £4 17s. 6d.; bars, £6 5s.; boiler plates, £6 12s. 6d. to £6 15s. During January large orders were given out, and hematites advanced 2s. 6d. per ton. This, however, was followed by a falling off in trade, with a downward move in prices, which continued right on until towards the close of the year, when an active demand sprung up for all descriptions of structural material. Considerable business was done in hematites, and although for a time all descriptions of plates, both for shipbuilding and boiler-making purposes, were necessarily affected by the engineering trades dispute, these also gradually improved. The lowest prices touched were about 55s. 6d. to 56s. for hematites; local-made steel billets were forced down by competition from America to about £4 3s. 3d.; steel bars, £5 17s. 6d. to £6; common steel plates, £5 7s. 6d. and £5 10s., and steel boiler plates, £5 17s. 6d. to £6 per ton. On these low prices, however, there has, during the last two or three months of the year, been a steady recovery generally, until hematites have got back to about 56s. 6d. and 57s. 6d. less 2½; steel billets, £4 6s. 6d. net; bars, £6 to £6 5s.; common plates, £5 17s. 6d., and boiler plates, £6 5s. per ton.

In the coal trade the position during the year has been one of fair activity, so far as the weight of business put through is concerned, but there have been plentiful supplies, and prices have shown no real improvement. House-fire coals have shown the usual season fluctuations. The January prices were on the basis of about 10s. 6d. to 11s. for best Wigan Arley; 8s. 6d. to 9s. for Pemberton four ft. and seconds Arley; and 7s. to 7s. 6d. for common house-coal at the pit-mouth. Notwithstanding only a moderate demand these were generally maintained until about the close of February, when the usual easing down to summer rates commenced, and prices gradually receded until July and August, when they got down to 6d. and 1s. per ton below the above figures. With September prices began to harden again, and with the close have got back to practically the same level at which they stood in January last. With regard to other descriptions of fuel for steam, forge, and general manufacturing purposes, although the demand for these was to some extent curtailed during the second half of the year by the protracted engineering dispute, and the unsettled outlook in the cotton trade, business generally has been fairly satisfactory as to quantity, the chief complaint on the part of colliery owners being that they have not been able to establish any real advance on the low prices ruling during 1896. During the early months of the year general activity throughout all the principal coal-using industries brought forward an active demand, and 6s. 6d. was maintained as a firm price for ordinary steam and forge coal at the pit. With the restricted demand for house coals, however, supplies of steam and forge coals were kept plentiful, and prices gradually got down as the year advanced to about 5s. 9d. and 6s. 3d. Right on to the close supplies have been ample to meet requirements, which, as already stated, have been restricted by the engineers' dispute. With the closing month of the year, however, there has been a recovery in prices, which have got back to about 6s. 6d. as the minimum at the pit-mouth. The shipping demand has been fairly good during the greater part of the year. At the commencement 7s. 9d. to 8s. was got for steam coal at the ports, and 8s. to 8s. 3d. at the Ship Canal, but these prices necessarily followed the downward move when increasing supplies later on in the year weakened the position of collieries, and to move off surplus lots during the summer months' sales, in some instances, were made as low as 6s. 9d. and 7s. 3d. delivered Mersey ports. Subsequently, however, the demand for shipment showed considerable briskness, and here and there advances of about 6d. were established over the low prices taken during the same period of 1896, and with the close, colliery proprietors have had no difficulty in getting 8s. to 8s. 3d. for good qualities of steam coal at the ports on the Manchester Ship Canal, with ordinary descriptions offering delivered Manchester Docks about 7s. per ton With regard to gas, coal, and locomotive fuel contracts, there was a general determination on the part of colliery owners, when enquiries for these began to come upon the market during April, to hold out for some advance on the excessively low figures ruling in 1896, and in some cases 3d. to 6d. over last year's rates was quoted. The unsatisfactory outlook in the general branches of trade owing to the disturbed labour position and the unsettled outlook abroad tended so much to destroy any confidence in the future that it was found practically impossible to establish any material advance on the previous season's rates. On gas coal it was very exceptional where any advance was got. On all the really large transactions colliery owners had to accept very much the same basis as last year, averaging 6s. to 6s. 6d. at the pit for ordinary Wigan four-ft. and 7s. to 7s. 3d. for good screened Arley gas coal. As regards locomotive fuel, one of the large railway companies early on in the season renewed their contracts at the same price as last year, representing 5s. 9d. per ton at the pit-mouth. Although many of the Lancashire colliery owners declared their determination not to accept contracts for locomotive fuel on this basis, the above figure practically settled the price for all future contracts that were given out. Engine fuel has shown no great variation during the year. Supplies have of course fluctuated according to the demand for round coals, but except that the very inferior sorts of slack during the summer months got down to about 2s. 9d. and 3s., the average for the whole of the year has remained about 3s. to 3s. 6d. for common; 3s. 9d. to 4s. 3d. for medium; and 4s. 6d. to 5s. for the better qualities at the pit-mouth.

BELFAST TRADE NOTES.

(From our own Correspondent.)

ALTHOUGH Belfast, in comparison to many of the other large centres of the shipbuilding and engineering industries, is not so badly off, still the protracted lock-out is being felt by not a few in this city, and it is not to be wondered at if much anxiety is being felt and expressed with regard to the outcome of the conference at present being held in London between the A.S.E. and the federated masters. What the result of this conference will be it is difficult to anticipate, but it is to be sincerely hoped that some amicable arrangement will be arrived at between the parties concerned, as without doubt the lock-out is crippling a great many other industries here.

Much curiosity has been expressed here and elsewhere as to why Messrs. Harland & Wolff, Limited, have so steadfastly held aloof from the Masters' federation, and doubtless the real reason, as revealed by the Right Hon. W. J. Pirrie (Lord Mayor of Belfast), in a speech made by him at a banquet given in his honour on the 14th inst., on his retiring from the civic chair, will come as a surprise to everyone and create no little discussion in engineering circles. In replying to a toast in his honour, proposed by Lord Dufferin, Mr. Pirrie said that in reference to the struggle which is still going on in the engineering trade, he felt it his duty to define his position in regard to this unfortunate dispute. He said he frankly admitted and extremely regretted his inability to take the same view as the majority of his fellow-employers. He had taken the greatest pains to study the matter in all its bearings, but a comprehensive view in the light of the experience gained in the working of his own establishment, and a careful study of the industrial problems of the present day, only confirmed the strong opinions held by him regarding the impossibility of satisfactorily and permanently adjusting matters by the recourse to measures which might have been well enough fifty years ago, but are utterly impracticable at the end of the nineteenth century. He then asks the questions, "Why should masters on the one hand and workmen on the other, regard each other with suspicion and enmity? Are not Capital and Labour mutually dependent upon each other?" Continuing, he said that personally he was not so much alarmed as some people seemed to be, by the increasing competition of other countries; he was rather inclined to believe that competition would stimulate rather than injure the shipbuilding and engineering trades, provided the masters themselves realized the all-important fact that they must employ the best and most competent workmen and use the latest and most improved machinery. With regard to the hours question, he went on to say, arrangements might be made whereby two, or even three, shifts of eight hours each might be worked during the day of twenty-four hours; if such could be arranged, he was confident that we should be able to hold our own in face of the increasing competition with which the country was threatened. These were his views, briefly stated, and these were the reasons why the firm of Harland & Wolff, Limited, have had nothing to do with the present dispute in the engineering trade. Such a direct statement coming from the head of one of the largest shipbuilding concerns in the world, and given at such a critical

moment, will certainly give great stimulus to the engineers in seeking to gain their point.

Last month we referred to the royal mail steamer *Briton*, which has since left this port for Southampton, and is now on her first voyage to the Cape. This is the largest steamer that has ever left a British port for a British Colony. The work of constructing this Leviathian commenced on September 12th, 1896, and she was launched in June last. The *Briton* has been built by Messrs. Harland & Wolff, and when completed for sea her total weight would be 17,700 tons, and her net tonnage 10,300 tons. Her length between the perpendiculars is 544 ft.; breadth, 60 ft.; depth, from keel to upper deck, 40 ft. The ship's twin-screws are driven by triple-expansion engines of 10,000 H.P., and a speed of 13 knots an hour is looked for. The consumption of coal to feed the 48 furnaces of her seven boilers between Southampton and the Cape, is estimated at some 2,500 tons. The *Briton's* crew number 237 hands all told, while she will be able to accommodate 904 passengers, there being berths for 300 in the first class, 200 second class, and 300 third-class. That part of the ship set apart for first-class passengers is most luxuriously fitted. The prevailing tone of the decoration in the state-rooms is ivory white, picked out with gold, with panelling of mahogany and light oak. The saloon is panelled throughout in carved oak, with ground of dead gold, while the ceiling and cupola is in pale and metallic green. The library furniture is old English in style, while the smoking room is bright in cream and gold lincrusta, with upholstering in richly-embossed leather. In the second-class, the decorations are, of course, lese ornate, but what might be called the public rooms are more attractive than is often provided for first-class. The accommodation in the third-class is also of superior description. Much could be said with regard to the thorough manner in which the ship is ventilated, also the provision made for any breakdown in lighting or machinery, but we have not sufficient space at our disposal. Certainly the Union Steamship Co. are to be congratulated upon having such a magnificent vessel as the *Briton*, which reflects credit on both owners and builders.

The s.s. *Royston Grange*, which has been built by Messrs. Workman, Clark & Co., Limited, to the order of Messrs. Holder, Bros. & Co., London, ran her trial trip on Belfast Lough on the 15th inst. She is a steel screw steamer, 6,300 gross tonnage, and has an I.H.P. 2,200. With two exceptions she is the largest steamer launched during the present year by Messrs. Workman, Clark & Co. Although not so large as the s.s. *Langton Grange*, and the s.s. *Denton Grange*, recently built for the same line at the Belfast shipyard, the new steamer has excellent accommodation for passengers. The vessel is fitted with the latest improvements for the comfort of those on board. There are refrigerated provision chambers on board, and the steamer is fitted up with electric light and is classed 100 A1 at Lloyd's. After the trial trip, which was in every way satisfactory, the new steamer proceeded to London to load for the River Plate, whence she sails on January 8th, 1898, with passengers and cargo. The vessel will be engaged in the Brazilian trade between London, Liverpool, and Newport.

The s.s. *Lord Londonderry*, from Newport News, arrived in Belfast early this month and discharged 400 tons of pig-iron. This is the second consignment of pig-iron from the U.S.A. to this country.

We might here mention that the members of the Belfast Mechanical and Engineering Association were permitted to inspect the shipbuilding yard of Messrs. Harland & Wolff, Limited, during the present month. The first item of interest was the large travelling gantry, which has been erected over one of the largest ships for lifting the plates and beams used in the construction of the ships into position, and for carrying the hydraulic riveting machines, with which a large portion of the work is done. The gantry, which weighs about 500 tons, is carried upon a double line of rails along each side of the slip and is propelled by two hydraulic engines, one at each side. The principal attraction was undoubtedly the s.s. *Oceanic*, the large vessel in course of construction for the White Star Line, and which when finished will be the largest vessel afloat. In the present stage of the work the members had an opportunity of examining the construction of the double cellular bottom and the framing of the vessel. Some idea of the magnitude of the work may be gathered from the fact that the stern post casting alone weighs 45 tons. The large plate rolling, plaining, and flanking machines all called for attention and were much admired. The hydraulic and engine-room were next visited, and after these the electric light and power-house, where the members had explained to them the different features of interest, including the storage battery, switchboard, and an electrical drill.

Another steamer has been launched from this yard during the month named the *Brasilia*, for the Hamburg-American line. The vessel is 500 ft. long by 62 ft. beam and 38 ft. deep. She is over 10,000 tons gross, and has accommodation for a few first-class and 600 steerage passengers. She is fitted with every mechanical facility for the rapid loading and discharge of cargo, as also with refrigerating machinery and a complete installation of electric light. She is fitted with quadruple expansion engines, specially designed to avoid vibration, and similar to those of other vessels built for the same owners. The vessel has been built to the highest class of Germanischer Lloyd's.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow.—There is very little new to report in connection with the shipbuilding industry of this district. Business, so far as new orders are concerned, has been very quiet, and naturally so when builders are not able to quote for delivery of tonnage at any definite date. The engineers' dispute has played havoc with the trade during the last two or three months, and has put an almost total check to the inflow of orders. Further than this builders have not not been able to proceed satisfactorily with the work they have already in hand, and certain departments are at a complete standstill because work cannot be further proceeded with until the engineers are again at work. Things are, in fact, approaching a state of paralysis, and it is evident that if the strike does not soon terminate, further stoppages will ensue. But a more serious position exists in relation to the fact that shipowners will not order new ships under present conditions. Doubtless at an early date the dispute will be over, and then builders may look for a marked accession of business from various sources, and, of course, keen competition will be experienced in getting what orders there may be to be given out. Marine engineers will certainly be busy, as the work they have in hand has grown enormously during the twenty-three weeks during which the strike has lasted, and the shops are filled with castings ready for the machines. The progress made in the shipbuilding and engineering departments of trade during the month has not been considerable. There have been no launches although the *Duke of Cornwall*, twin-screw steamer for the Belfast and Fleetwood service, is ready, but her engines are behind, and this is one of the jobs that will first be tackled when the men get back to work. It will also be necessary to complete H.M.S. *Niobe*, first-class cruiser, on which the work has been kept at a practical standstill for some time. It will take the engineers about a month to complete this job, and then the *Niobe* will be ready for her trials. Her sister ship, the *Amphitrite*, is getting well on for launching, and after the *Niobe* has left it may be expected that she will be brought round to the engineering side of the works to receive her engines and boilers and to be thoroughly equipped for sea. Several repair jobs are receiving attention.

West Cumberland.—In this district shipbuilders are fairly well employed, and are likely to remain so on small craft, for which there is a good run of contracts.

Shipbuilding Materials.—There is a steady demand for shipbuilding material, and during the month some considerable contracts have been placed with local makers, especially for heavy plates. There is every prospect of a large business in all classes of shipbuilding material after the turn of the year. The mills have been uninterruptedly employed now for a few years, and it is evident, from present prospects, this activity will long be maintained. Prices remain steady.

Hematites.—The hematite pig-iron trade is steadily employed, and 41 furnaces are in blast as compared with 36 in the corresponding week of last year. Makers are well off for orders and are quoting 48s. 6d. to 50s. 6d. per ton for mixed Bessemer Nos. net f.o.b., while warrant iron is at 47s. 10d. net cash sellers, 47s. 9½d. buyers. Stocks have slightly increased, and now stand at 187,520 tons.

Shipping.—The shipping trade, with the exception of a few weeks of stormy, has been well employed of late. The exports

this year up to now have been 416,179 tons of pig-iron, and 443,044 tons of steel as compared with 315,313 tons of pig-iron, and 470,312 tons of steel in the corresponding period of last year, showing an increase of 100,866 tons of pig-iron and a decrease of 27,268 tons of steel.

THE GRAVET SLIDE RULE.

THE opening meeting of the session of the Hull and District Institution of Engineers and Naval Architects was held on Monday, November 15th, Mr. R. Pawley, M.I.C.E., president, in the chair. After the usual formal business had been transacted, a paper was read by Mr. Thomas Wright, Assoc. M.Inst.C.E., on the "Gravet Slide Rule." The lecturer gave notes on the principle of the rule, and on the various operations which can be performed by its aid, and also gave exact rules for finding the value of the answer in all cases. Mr. Wright expressed an opinion that it is a matter of surprise that so few engineers avail themselves of this aid, and pointed out that this is partly caused by the fact that so few seem to know how simple and correct is its use, and because there are not many sources of information giving a clear explanation of the rule and its capabilities, with instructions which cover all possible examples of the particular operation described. Many engineers purchase a slide rule, intending to master its use, but find that they cannot rely on the accuracy of the answers obtained, and the reason for this was given as being that they did not secure efficient instruction in the first instance, and as they did not give the matter sufficient study to evolve methods for themselves, the rule was not properly appreciated. As regards the error in the answers obtained by the use of the rule, the average, taken from a large number of examples, worked out on a rule 25 c/m long, and afterwards by arithmetical methods, was given as about 0·1 per cent., or 1 in 1,000, this degree of accuracy being ample for nearly all engineering calculations. The consideration of the rule was led up to by the author, with the aid of lantern slides, showing that a slide rule is merely a table of logarithms arranged graphically on two adjoining scales, which may be made to slide relatively to each other, by which means distances representing the mantissæ of the logarithms of numbers may be added or subtracted, and the number corresponding to this sum or difference at once read off. The paper then dealt in detail with the following operations, and gave definite rules for the value of the answer under all conditions, each operation being illustrated on a model rule, with scales 50 in. long:—Multiplication, division, continued operations of multiplication and division, proportion, squares, cubes, and powers of numbers, square and cube root, two-thirds power or cube root of the square of numbers, miscellaneous roots, rules for finding areas of circles, with one setting only of the slide, and notes on the use of constants. A few novel methods were given for some of these operations, notably for the two-thirds power of numbers as required in formulæ comparing the I.H.P., displacement, and speed of vessels. It was shown that this power of any number can be found with one setting only of the slide, and the digits of the answer read with a very small error, and the proper value given to those digits with absolute certainty, there being no hesitation as to the position of the decimal point in the digits found, or as to the number of digits in the answer. The paper clearly showed how all the necessary calculations can be easily performed by persons whose knowledge of mathematics is limited, and will, no doubt act as a useful stimulus to those present, influencing them to take up the study of this instrument. Professor Fuller's circular rule and Boucher's pocket calculator were also explained, and their special advantages pointed out. At the close of the paper a discussion took place, in which the following gentlemen took part:—Messrs. R. Pawley, H. F. Fourny, and A. N. Somerscales, Mr. Wright replying to the points raised. A hearty vote of thanks was accorded Mr. Wright for his most interesting and valuable paper, on the motion of Mr. R. Pawley seconded by Mr. F. H. Pearson.

Messrs. James Howden & Co., engineers, Glasgow, have, during the last twelve months, booked contracts for the application of their well-known system of forced draught to 108 large steamers, having an aggregate I.H.P. of 301,200. When the contracts now in hand are completed, the system will have been applied to boilers supplying steam for 1,640,700 I.H.P., the total number of installations being 655, the power of some of these installations being as high as 30,000 I.H.P.

Leask's Engineers' Handbook.—In the October number we noticed a new edition of "Leask's Engineers' Handbook," and since then a large number of inquiries have been received regarding the price of the handbook. We may mention that it is gratis, and will be sent post free to any address upon application to Leask's Marine Academy, 95, Minories, London, E.

The late Mr. William Terriss.—It is an interesting fact not generally known, that the late Mr. Terriss, the renowned Adelphi actor, who was so cruelly assassinated last month, followed the calling of a marine engineer, having in the year 1868 been at the works of Messrs. John Penn & Sons, of Greenwich. From the same works in times past, other prominent men have come and branched off into other channels quite apart from engineering, among which may be mentioned Mr. Linley Sambourne, the well-known caricaturist of *Punch*, Mr. Corney Grain, and the two German Reeds, the public entertainers, and John Cameron Graham, the well-known barrister.

The Institute of Junior Engineers.—In connection with a paper on "Main Engine Auxiliaries in the Mercantile Marine," read before this institution December 10th, a visit was paid on December 4th to Messrs. Shaw, Savill & Albion Co.'s s.s. *Aetea*, lying in the Royal Albert Docks. The chief engineer, Mr. M'Culloch, received the members, and in showing them round indicated the features of special interest in the main engines and the various auxiliary machines. Two sets of Haslam's refrigerating machines are installed for the frozen meat freight, a heavy cargo of which was being unshipped at the time of the visit. Before the party dispersed, Mr. H. B. Vorley, the chairman of the institution, expressed the members' acknowledgments for all that had been arranged for their reception

Personal.—Mr. Leslie S. Robinson, of 28, Victoria Street, Westminster, S.W., informs us that, owing to his continually increasing business, he has taken into partnership Mr. Frank D. Outram (late of the Royal Engineers), and owing to the resumption by his family of the original spelling of their name, the firm will, on and after the 1st of January, 1898, be known as "Robertson & Outram," under which style all future business will be conducted.

The Reliance Lubricating Oil Co.—We have received a catalogue from the Reliance Lubricating Oil Co., of 19 and 20 Water Lane, Great Tower Street, London, E.C., which contains an extensive description and list of prices of the various classes of lubricants that are supplied by this firm. A special feature appears to be non-corrosive and non-inflammable, or non-combustible oils, which are intended to give absolute immunity from risk of spontaneous combustion. This firm, among other devices, deal in patent oil cabinets, and various forms of viscometers. Besides the catalogue they present their customers with an inkstand of a design characteristic of their particular trade.

"Linde" Machines.—In the well-known "Linde" refrigerating and ice making machinery the Linde British Refrigeration Co. have done a considerable increased trade. Altogether, up to the present time, over 3,400 Linde Machines have been supplied, the total refrigerating effect being equal to that produced by the melting of no less than 75,000 tons of ice every 24 hours. In this country, cold storage and ice making factories on the Linde system, on a large scale, have been or are being erected at Bristol, London, Nottingham, Grimsby, Hull, Leeds, Bradford, Glasgow, Liverpool, Bath, and other places, while very many similar installations have been put up. On board ship, nearly 500 machines have been fitted, and the Linde system has lately been adopted for ten ships for the new Canadian Service, fifteen for various Japanese Lines, seven for the Union Steamship Co., of New Zealand, and eight yachts, including those for the German Emperor, the King of the Belgians, the Prince of Monaco, and the Duke of Sutherland. The Linde British Refrigeration Co. have also orders for machines for the British Admiralty, and have in hand the machinery for five large meat carrying vessels for Messrs. Turnbull, Martin & Co., and for the New Zealand Shipping Co., each vessel to carry 100,000 carcasses of mutton, or about 2,500 tons

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Gertie and Lizzie.—On November 22nd two new trawlers were launched from the yard of Earle's Shipbuilding and Engineering Co., Limited, at Hull, for the Fleetwood Steam Fishing Co., Limited. The christening ceremony was undertaken by Miss Minnie Cole and Miss Beatrice Mason, who respectively named the vessels *Gertie* and *Lizzie*.

Luciana.—On Tuesday afternoon, November 23rd, this vessel was launched by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and is built to the order of the Hamburg-Pacific Dampfschiffs-Linie, of Hamburg. Her principal dimensions are:—Length, between perpendiculars, 382 ft.; breadth, extreme, 48 ft. 2 in.; depth, moulded, 29 ft. The vessel is designed to have a deadweight capacity of over 6,800 tons. She is built to Lloyd's highest class under their special survey, on the three-deck rules, the upper and main decks being laid complete, and the lower deck in the forward holds. The poop and bridge are joined, making a long full poop extending from the stern to the after-end of the main hatch. At the fore-end of the bridge is placed accommodation for about twenty first-class passengers, with a commodious and handsomely fitted-up saloon, and the usual accommodation for the captain, doctor, steward, dispensary, bathroom, &c. The entrance to the saloon and passengers' berths is through a handsomely fitted entrance house on the bridge deck, in front of which is placed the chart-house. On top of this entrance and chart-house is placed the flying bridge. The engineers' and officers' accommodation and messroom, with steward's berth, bath, &c., is placed in side houses at the after-end of the engine casings. The seamen, firemen, and petty officers are berthed in the topgallant-forecastle, under which is accommodation for a limited number of emigrants. The usual storerooms are fitted forward, also a large ice-room. The vessel is built on the cellular double-bottom principle. She has six watertight bulkheads, with an iron reserve bunker bulkhead, and an iron longitudinal bulkhead for part of her length. Special attention has been paid to the loading and discharging facilities, and these are of the most complete description. Eight powerful winches are fitted at the hatches. The other deck fittings consist of a powerful steam windlass, a steam steering gear placed at the after-end of the casings with controlling gear from captain's bridge. Five boats are provided, three of them being lifeboats. The vessel is rigged as a two-masted fore-and-aft schooner, and is built to a high-class specification. The vessel is fitted with a complete electrical installation by Messrs. The Sunderland Forge and Engineering Co., Limited, of Pallion, Sunderland. The engines and boilers are constructed by Messrs. George Clark, Limited, the sizes of the cylinders being 27 in., 44 in., 72 in. by 48-in. stroke, supplied with steam by three large multitubular boilers working at 165 lbs. pressure. The boilers are built to meet the requirements of the German law. This is the second vessel built by this firm for these owners.

Koordistan.—On Wednesday, November 24th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Koordistan*, which they have built for Messrs. Frank C. Strick & Co., Limited, of Swansea and London. Her principal dimensions are:—Length, over all, 316 ft.; breadth, extreme, 43 ft.; and depth, moulded, 20 ft. 10 in. Her class will be the highest at Lloyd's. The type is that of partial awning deck with raised quarter-deck and poop, and the rig fore-and-aft schooner with telescoping masts. Very tasteful cabin accommodation will be provided under the poop, consisting of saloon, state rooms, captain's and officers' rooms. The engineers' quarters are amidships, and the crew's berths forward. The sides of the vessel are supported by strong web frames taking the place of hold beams as far as possible, and leaving a clear hold for stowing bulky goods. A cellular double bottom is fitted, and also an after-peak tank for water ballast, and iron grain divisions, while the steam windlass, steam steering gear amidships, hand-screw gear aft, steam winches, marine type donkey boiler, and the whole of the outfit are of the most approved description. The machinery for the *Koordistan* will be supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited, the engines being of the triple-expansion type, with cylinders 23 in., 36½ in., and 62 in. diameter, and a piston stroke of 39 in. to receive steam from a large steel multitubular boiler working by forced draught at a pressure of 160 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Archibald Walker, on behalf of the owners, and the ceremony of naming the *Koordistan* was gracefully performed by Miss Forster, Sydney, South Australia.

Tremont.—On Wednesday, November 24th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer built to the order of E. C. Thin, Esq., of Liverpool, and of the following dimensions, viz.:—Length, 350 ft.; breadth, 47 ft.; depth, 28 ft. 3 in., moulded, and to class 100 A1 at Lloyd's on the spar deck rule. This vessel has water ballast fitted right fore and aft on the cellular system and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including five double cylindered steam winches, direct-acting steam windlass, steam steering gear, by Messrs. The Harrison Engine Co., Limited, and Hastie's screw gear aft. The engines, which are to be supplied by Messrs. The North-Eastern Marine Engineering Co., Limited, are of the triple-expansion type having cylinders, 25½ in., 41 in. and 68 in. by 48 in. stroke, and working at a pressure of 160 lbs. On leaving the ways the vessel was named the *Tremont* by Mrs. T. Young, of South Preston, North Shields. During construction the vessel and engines have been under the superintendence of Captain Lodge and Messrs. Irwin, Atkinson, and Young respectively.

Plencia.—On Thursday, November 25th, Sir Raylton Dixon & Co., Limited, launched from their Cleveland Dockyards, Middlesbrough, a steel screw steamer built to the order of Senor Ramon de la Sota, of Bilbao, under the personal supervision of Captain Ricardo de Goicoechea. She is built to Lloyd's highest class, her principal dimensions being:—Length, 299 ft.; beam, 42 ft.; depth, moulded, 20 ft. 3 in.; and has a deadweight carrying capacity of about 3,500 tons on a light draught of water. Triple-expansion engines will be fitted by Messrs. Blair & Co., Limited, of Stockton-on-Tees, having cylinders 22½ in., 36½ in., 60 in., by 39 in. stroke, with two large single-ended boilers working at 160 lbs. pressure. On leaving the ways she was gracefully named *Plencia* by Senorita Josefa Gallarza, of Bilbao.

Keresby.—On Thursday afternoon, November 25th, there was successfully launched from the West Shipbuilding Yard of C. S. Swan & Hunter, Limited, Wallsend, a specially designed cargo steamer built to the order of the Denaby and Cadoby Main Collieries, Limited, capable of carrying a large cargo on a light draught. The dimensions of the vessel are 325 ft., by 47 ft., by 24 ft. depth moulded, her deadweight cargo being 4,650 on 19 ft. 6 in. draught. The vessel is built to the three-deck rule, with one deck laid, and close 'tween deck beams, and is built to the highest classification at Lloyd's. Her machinery is built by Sir Christopher Furness, Westgarth & Co., Limited, of Middlesbrough, and consists of a set of latest design of triple-expansion engines, having cylinders 24 in., 38 in., and 64 in. by 43 in. stroke, supplied with steam by three large single-ended boilers. During construction the steamer and machinery have been superintended by Messrs. Jamieson & Co., of Hull, the marine superintendents for the Denaby & Cadoby Main Collieries, Limited. On leaving the ways the vessel was christened the *Keresby* by Mrs. O'Brady Jones.

Trelyon.—On November 25th there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, West Docks, South Shields, a steel screw steamer of the following dimensions:—Length, 323 ft.; breadth, 47 ft.; and depth moulded, 25 ft., to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall. The vessel is of the improved single-deck type, with full poop, long bridge amidships, and topgallant forecastle, and is fitted with all the latest improvements for the rapid loading and discharging of cargo. Her engines, also built by Messrs. John Readhead & Sons, are of the triple-expansion type, having cylinders 24 in., 40 in., and 64 in., with 42 in. stroke, steam being supplied from two large steel boilers working at a pressure of 160 lbs. per square inch. She was named *Trelyon*, and is the 32nd vessel built for the above firm by the same builders.

Monterey.—On November 25th there was launched from the Jarrow yard of the Palmer's Shipbuilding and Iron Co., Limited, a finely-modelled steel screw steamer to the order of Messrs. Elder, Dempster & Co., of Liverpool. The vessel is of the following dimensions, viz.:—Length, between perpendiculars, 445 ft.; breadth, extreme, 52 ft.; and depth,

moulded, 30 ft. 10 in. She will be rigged as a four-masted fore-and-aft schooner, and has been built under special survey to take the highest class in Lloyd's Registry. She is of the three-decked type, with two steel decks laid all fore-and-aft, and has an iron shelter deck for cattle extending over the whole length, and above this is a shade deck, covering the machinery openings. All the available space under the shelter deck, and along each side under the shade deck, is arranged with fittings for carrying cattle. Accommodation for the officers and engineers is arranged under the shade deck in steel houses, at each side of the engine and boiler casing, and for the seamen, firemen, and cattlemen forward. A cellular double-bottom is fitted all fore-and-aft, and is arranged for carrying water ballast and also for fresh water for supplying cattle. Water ballast is also arranged to be carried in a deep cargo tank and in the after peak, giving the vessel a total water ballast capacity of over 2,000 tons. The hull is subdivided into a suitable number of compartments by watertight steel bulkheads. The vessel is fitted with all the most modern appliances for the rapid loading and discharging of cargoes and for the general working of the ship. She is designed to carry upwards of 8,200 tons deadweight, on a mean draught of 25 ft. The engines, which are also being constructed by the Palmers' Co., are of the inverted vertical triple-expansion type, with cylinders 30 in., 50 in., and 81½ in. by 54-in. stroke, steam being supplied by three boilers, 14 ft. 6 in. diameter, by 17 ft. 6 in. long, with a working pressure of 180 lbs. She was christened the *Monterey* by Miss Alyce Wilson, daughter of Mr. J. P. Wilson, of Newcastle

John Exley.—On November 29th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, built to the order of the Leeds Co-operative Society, Limited, a steel keel of the following dimensions:—Length, over all, 62 ft.; beam moulded, 15 ft.; depth, extreme in midship, 6 ft. 9 in., and with a carrying capacity of 110 tons. She was christened *John Exley* by Mr. Eccles.

Spray.—On November 29th Mr. J. S. White launched at Cowes, for Messrs. Shepherd Brothers, the steel-coasting steamer *Spray*, a vessel of 65 tons.

Princess Alice.—On November 29th there was launched from Messrs. Laird Brothers' works at Birkenhead a large auxiliary yacht of the following dimensions, viz.:—Length, between perpendiculars, 225 ft.; beam, 34 ft.; depth, 20 ft.; and her tonnage is 1,270 tons O.M. The hull is built of steel, divided into seven watertight compartments extending to the upper deck. The vessel has a poop and togallant forecastle, will be rigged as a schooner with yards on the foremast, and have a large spread of canvas. The yacht was built for his Serene Highness the Prince of Monaco, and was named *Princess Alice*, the christening ceremony being performed by her Royal Highness the Princess, who, together with the Prince and a small party of friends, had come to England specially for the ceremony. The scientific work accomplished by the Prince in his original yacht, the *Hirondelle*, up to 1889, and since then in the first *Princess Alice*, has, as is well known, been very extensive, and has developed so greatly that the last-named yacht has been found too small for the proper carrying out of these important researches. She will be a fast vessel, propelled by engines of 1,000 H.P., and designed to ensure a speed of 12 knots.

Caithness.—On December 9th there was launched from the yard of Messrs. William Doxford & Sons, Limited, Pallion, the turret-deck steamer *Caithness*. This vessel has been built under Bureau Veritas special survey, to the order of Messrs. Benjamin J. Sutherland & Co., Newcastle, and has a deadweight capacity of 5,600 tons, her dimensions being 340 ft. by 45 ft. 6 in., by 27 ft. 3 in. The machinery, which has also been built by Messrs. Doxford, consists of triple-expansion engines 26 in., 42 in., and 68 in. by 42 in. stroke, and two boilers 15 ft. 6 in. diameter, by 11 ft. long. The launch was witnessed by a large number of friends of the owners, the christening ceremony being performed by Mrs. Wandless, of Newcastle. After the vessel left the ways the visitors adjourned to the offices, where luncheon had been provided by the builders, and in accordance with the time-honoured custom, "Success to the vessel" was proposed and responded to. The launch of the *Caithness* brings the total number of Turret steamers now afloat up to 36.

Arminza.—On Thursday, December 9th, Sir Raylton Dixon & Co., Limited, launched from their Cleveland Dockyards, Middlesbrough, a steel screw steamer, built to the order of Senor Ramon de la Sota, of Bilbao, under the personal supervision of Captain Ricardo de Goicoechea. She is constructed to Lloyd's highest class, her principal dimensions being—Length, 299 ft.; beam, 42 ft.; depth, moulded, 20 ft. 3 in., and has a deadweight carrying capacity of about 3,500 tons on a light draught of water. Triple-expansion engines will be fitted by Messrs. Blair & Co., Limited, of Stockton-on Tees, having cylinders 22½ in., 36½ in., 60 in. by 39 in. stroke, with two large single-ended boilers working at 160 lbs. pressure. On leaving the ways she was gracefully named *Arminza* by Mrs. Rosevear, wife of Mr. George S. Rosevear, agent for the owner.

Green Jacket.—On Thursday afternoon, December 9th, this vessel was launched by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and has been built to the order of Mr. George Hallett, of Cardiff, and is the fourth vessel built by the firm for this owner. Her principal dimensions are:—338 ft. by 47 ft. by 24 ft. depth, moulded. She is built to Lloyd's highest class on the improved single-deck rules, having a poop and bridge arranged for cargo, the accommodation for the engineers and officers, saloon, captain, &c., being in a house on top of the bridge, and the seamen and firemen berthed in the topgallant forecastle. The vessel is built on the cellular double-bottom principle, with web frames and longitudinal intercostals. The deck machinery consists of five steam winches, a patent steam windlass, steam steering gear placed at the after end of the bridge with controlling gear to flying bridge; a large multitubular donkey boiler, and a powerful screw steering gear aft. She is rigged as a two-masted fore-and-aft schooner. The vessel is fitted with four boats, iron longitudinal bulkheads, and six transverse watertight bulkheads, and is specially built for a large deadweight and cubic capacity, the gross tonnage being about 2,850. The launch was most successful, the vessel being christened by Miss Nell Hallett, daughter of the owner, and there was a numerous company of ladies and gentlemen present. After the launch, the company adjourned to the firm's luncheon-room, where the usual toasts were duly honoured.

Harlingen.—On Thursday, December 9th, Messrs. William Gray & Co., Limited, launched the fine large steel-screw steamer *Harlingen*, which they have built the order of Messrs. J. & C. Harrison, of London. She will take Lloyd's highest class and is of the following dimensions, viz.:—Length, over all, 336 ft.; breadth, 47 ft.; depth, 24 ft. 10 in.; and the deck erections consist of poop, bridge over machinery space and topgallant forecastle. A handsome saloon and state-rooms together with the captain's and officers' rooms will be fitted under the poop. The hull is built with web-frames and cellular double bottom for water ballast. Five steam winches, steam steering gear amidships, and screw gear aft, patent direct steam windlass, patent donkey boiler, grain divisions, stockless anchors, and a complete outfit will be fitted for a first-class cargo boat. Fine engines on the three-cylinder triple-expansion principle are being supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited: they will develop over 1,200 H.P. The cylinders are 24 in., 38 in., and 64 in. diameter, with a piston stroke of 42 in., and fine extra-large steel boilers, having a pressure of 160 lbs. per square inch, will give an ample supply of steam. The ceremony of christening the *Harlingen* was gracefully performed by Mrs. W. C. Gray, of Staincliffe, Seaton Carew.

Express.—On December 11th, in the presence of a distinguished company, Messrs. Laird Brothers launched from their works at Birkenhead the torpedo-boat destroyer *Express*, for H.M. Government. Amongst those who accepted the invitation to be present were officers of the Argentine, Italian, and Japanese Navies: Captain J. Grigorvitch, naval attache to the Russian Embassy; Captain Carr, aide-de-camp to the Prince of Monaco; Admiral Gough, R.N., C.B.; Mr. C. W. Bearblock, R.N., engineer appointed to the *Express*. The christening ceremony was gracefully performed by Mrs. John Laird. The *Express* is the largest destroyer ever built. Her length is 235 ft, and she is designed to have a speed of 33 knots per hour, which will make her the fastest vessel afloat.

LAUNCHES.—Scotch.

Cassyana.—On November 17th a steel schooner-rigged steamer, of about 300 tons, was launched at Port-Glasgow. She was named the *Cassyana*.

Boadicea.—On Thursday, November 25th, Messrs. Alex. Stephen & Sons launched, at Linthouse, a large four-masted steamer, built to the order of Messrs. Furness, Withy & Co., Limited, and to be run by the Wilsons and Furness-Leyland Line, Limited, of London, in their weekly passenger line between London and New York. The vessel is also fitted for the cattle trade, and is capable of carrying cargo to the extent of about 8,500 tons deadweight, or about 15,500 measurement tons. She has been constructed under Lloyd's rules for the 100 A1 three-deck-rule class, with many extras in excess of their requirements, and also conforms with the Board of Trade rules for passenger certificate. She has three complete steel decks besides the shelter deck, which is also of steel amidships, sheathed with yellow pine. There are nine watertight bulkheads, and double-bottom fore and aft, forming the ballast tanks. The dimensions of the hull are:—Length, over all, 500 ft.; breadth, 52 ft. 3 in. depth, moulded, from upper deck 34 ft. 6 in. Accommodation for 150 first class passengers is provided in a large bridge house on top of shelter deck (the bridge extending the whole breadth of the ship), and a large deckhouse on top of this extending nearly the whole of the bridge, but leaving a passage of about 7 ft. at side, over which the promenade deck is carried, forming a sheltered promenade. Abaft the saloon the starboard side is occupied by passengers' state-rooms, the port side by cabins for officers and engineers; while other officials, &c., are located at after end with separate entrance. Leading up from this deck to deck-house above is a handsome staircase forming companion way and passages, which are lined in wainscot work, with friezes and panelled spaces in modelled canvas gilt and coloured. The clever manner in which light wells or shafts have been worked in with the stairways has afforded opportunities for introducing interesting variations in the design, and the borrowed lights show to good effect. In this deck-house is the music-room. It is of a very lightsome and graceful character. Some of the features of the Louis XV., or old English, periods are clearly traceable in the ceiling and walls, which are of delicately modelled Tynecastle canvas and the woodwork is in a very light, mellow plane-tree. The figured velvet seat covers are in a shade of grey blue which is harmonious with the decorations, and there is a feeling of coolness and elegance. The piano is recessed in the after wall; and on either side of it is a handsome bookcase and over it is a screen of tinted glass, admitting light from the shafts which supply the top light of the saloon. There are state-rooms on port and starboard sides. At the after end is the smoking-room. Here the panelling is of teak with small carved panels, and the delicately modelled canvas ceiling, in the Adams style, is painted in a light sage tint. A prominent artistic effect is obtained by the covering of a semi-circular curved wall which projects into the room around, which is a luxurious seat. This wall is covered with a handsome hand-painted leather design, of old Spanish character. The roof on this deck-house is carried out to ship's side, and supported by stanchions forming a large promenade deck, at fore end of which is a deck-house containing captain's room, chart-room and wheel-house and a double staircase leading to cabins below. The seamen, firemen, and cattlemen are berthed forward on the upper deck. On the shelter deck—which is the working deck of the steamer—are fitted cargo-working appliances of the most efficient type. The combined hand and steam-steering gear is placed in a wheel-house on shelter deck aft, and has been supplied by Hastie, of Greenock. Electric light, supplied by Messrs. W. C. Martin & Co., is fitted throughout the entire vessel; and the whole of the living accommodation is heated by steam, and baths and wash-basins in the lavatories are supplied with both hot and cold water. "Pyles'" ingenious heaters are used, in which the water is heated by steam as it runs full-bore through the supply pipe. The galley is airy, well-lighted, and fitted with large cooking range, bakers' oven, and all other modern appliances. The pantry, which adjoins the saloon, is also of ample size, and contains hot press, tea and coffee boilers, &c. On deck below the passenger accommodation, and entirely separated from it in every way, is the provision for carrying cattle. It is sufficient for about 700 head, and is of the most improved and modern type, fully satisfying both British and American conditions. The machinery consists of one set of triple-expansion engines, having cylinders 32 in., 54 in., and 90 in. diameter respectively, by 66 in. stroke, each cylinder being fitted with a liner and separate valve face. Balance pistons are fitted to the i.p. and l.p. slide valves. The crank shaft is of forged ingot steel. The condenser has a very large cooling surface, and is made in Messrs. Stephens' usual style, viz.: of steel plates circular in form, a method greatly superior to the ordinary cast condenser, as it is practically impossible to break it. A large centrifugal pump for circulating purposes is fitted of Drysdale & Co.'s make, having two separate engines, each being capable of driving the pump at full speed. A jet injection is also fitted to the condenser. The air pump and two bilge pumps are worked off the l.p. cross-head. There are no feed pumps on the main engines, two Weir's pumps being fitted of large capacity. A large auxiliary duplex pump with gunmetal water end, of Clarke, Chapman & Co.'s make is also fitted and is constructed so as to act as a testing pump for the boilers when required. Another duplex pump of Clarke, Chapman & Co.'s acts as a fire extinguishing pump, and also as a fresh water pump for cattle purposes. A hand pump (which can be worked when desired by the main engines) is also fitted. A large pulsometer forms the ballast pump, which is capable of emptying the entire ballast tanks of the ship in a very short time. There is a 40-ton Quiggin's evaporator, which is also capable of acting as a condenser for the exhaust steam from the winches and auxiliary engines. A pulsometer is attached to the evaporator for circulating purposes. The feed water filters for arresting all grease and oil in the feed water is Quiggin's patent. The propeller has four blades of Parson's Manganese Bronze (Manganese Bronze Co.' s own make). The deck machinery consist of nine winches of Clarke, Chapman & Co.'s make, one with 10 in. cylinders by 16 in. stroke, one 8 in. cylinders by 2 in. stroke, and seven 7 in. cylinders by 12 in. stroke. The boilers are four in number, two double ended and two single ended, working at a pressure of 180 lbs. They are fitted with Henderson's patent rocking firebars, and have ample heating and grate surfaces to 5,000 H.P. at sea. Large ventilators have been fitted to the stokeholes. All labour saving appliances possible have been fitted, such as steam reversing gear, steam turning gear, steam ash hoists, &c. In short, the whole machinery has been designed and fitted so as to give the highest results both in efficiency and in economy in labour and fuel. A heavy list of spare gear, covering nearly all working parts of the machinery, has been supplied. The engines were built under the supervision of Mr. J. F. Kitching, and the hull under that of Mr. A. B. Walker, superintendent of the Furness Line. The steamer is to be commanded by Captain Jacobson. As the vessel left the ways she was gracefully named *Boadicea* by Miss Stephen, Kelly, Wemyss Bay.

Wellamo.—On November 25th there was launched by Messrs. Gourlay Bros. & Co., Camperdown Shipyard, Dundee, a steamer built to the order of the Finska Steamship Co., Helsingfors, Finland, for passenger and cargo trade on the Baltic. Her dimensions are:—Length, 200 ft.; breadth, 31 ft. 3 in. depth, 23 ft. 3 in.; gross tonnage, 1,035. She is constructed under special survey to the highest class in Lloyd's Registry. The vessel, as she left the ways, was christened *Wellamo* by Miss Lyon, daughter of Mr. J. G. Lyon, of Messrs. Gourlay Bros. & Co.

Cimbria.—On November 25th, Messrs. Lobnitz & Co. Limited, Renfrew, launched a handsome passenger and cargo screw steamer for the United Steamship Co., Denmark. The vessel, which was named *Cimbria*, is about 1,000 tons register, and will be fitted by the builders with triple-expansion engines and auxiliary machinery of the most modern type. The ship and machinery have been built under special survey of Bureau Veritas the vessel being specially strengthened for ice.

Steam Hopper Barge.—On November 25th Messrs. Wm. Simons & Co., Limited, Renfrew, launched from their yard at Renfrew, the first of two powerful steam hopper barges which they have on order for the Mersey Docks and Harbour Board. Dimensions:—Length, 205 ft.; breadth, 35 ft.; depth, 16 ft. 3 in., having a hopper capacity to carry 1,200 tons of dredging. The vessel is propelled by two sets of independent triple-expansion engines of about 1,200 I.H.P., supplied by steam from two return tubular boilers, working pressure 160 lbs. Steam appliances are fitted to work the hopper doors by steam power from independent engines placed at fore-and-aft end of hopper, also steam windlass forward and steam capstan aft. Cabins are placed at aft end of vessel for the accommodation of the officers, and at fore end

for the seamen and firemen. These vessels are constructed under the direction of A. G. Lysier, Esq., engineer for the Dock Board, Liverpool.

Roda.—On November 26th Messrs. Archibald M'Millan & Son, Limited, Dumbarton, launched a steel screw steamer of the following dimensions, viz.:—315 ft. by 44 ft. by 23 ft. 3 in. The gross tonnage is 2,520 tons, and the carrying capacity about 4,100 tons. The vessel is built on the single-deck principle to Lloyd's highest class, with poop, bridge, and topgallant forecastle, cellular double bottom, and is specially fitted up for grain carrying. Triple-expansion machinery is being supplied by Messrs. David Rowan & Son, Glasgow. She was named *Roda* and is built to the order of Messrs. C. T. Bowring & Co., London.

Yukon.—On November 27th there was launched by the Grangemouth Dockyard Co., a steel screw steamer, intended for the coal and ore trade, designed to carry 1,550 tons. The machinery is being supplied by Messrs. Sir Christopher Furness, Westgarth & Co., Middlesbrough-on-Tees. The vessel, built to the order of Mr. F. C. Boulanger, of Swansea, was named the *Yukon*, and has been under the superintendence of Mr. George W. Colmer.

Osceola.—On November 29th Messrs. David J. Dunlop & Co. launched, at Port-Glasgow, a steel screw steamer, built to the order of the Anglo-American Oil Co., Limited, of London. The dimensions of the vessel are:—Length, 140 ft.; breadth, 26 ft.; depth, moulded, 11 ft. 3 in. The engines are of the triple-expansion type, having cylinders, 13 in., 21 in., and 34 in. diameter, by 24 in. stroke, with one boiler 12 ft. 3 in. diameter by 10 ft. long. The rig is that of a two-masted fore-and-aft schooner. Water ballast is provided for trimming the vessel in both fore and after peak tanks. The steamer is intended for the carriage of oil in bulk or in barrels, and is specially fitted out for coasting trade. The oil tanks, which are four in number, have been constructed pretty much after the arrangement carried out in the larger oil steamers built by Messrs. Dunlop for the same owners, and were tested while on the stocks with a head of water to 12 ft. above the tank deck in presence of owners and Lloyd's surveyors. Not the slightest indication of a leak either in the bulkheads, deck, or shell was perceptible. As the vessel left the ways she was named *Osceola* by Miss Dunlop, Athole Place, Glasgow.

Buffalo and Hippopotamus.—On November 29th Messrs. Russell & Co. launched from Kingston Yard, Port-Glasgow, two barges, named *Buffalo* and *Hippopotamus*, for Mr. Joseph Constant, London. There are other two being built at Kingston for the same owner.

Knight Errant.—Lately Messrs. Charles Connell & Co., Whiteinch, launched a large and fully equipped steel screw steamer of the following dimensions, viz.:—Length, between perpendiculars, 470 ft.; breadth, moulded, 57 ft.; depth, moulded, 34 ft. 10 in.; with a tonnage of 7,700 tons gross, and deadweight carrying capacity of about 11,400 tons. She has been built under special survey of Lloyd's, with cellular double bottom right fore and aft, having transverse divisions, forming six separate compartments for water ballast, a high tank abaft engine bulkhead of large capacity, and the fore and aft peaks fitted as ballast tanks, the amount of water provided for being about 3,200 tons. The engines, built by Messrs. Dunsmuir & Jackson, Govan, are of the direct acting three cylinder consecutive expansion type, the high pressure cylinder being 27 in. diameter; intermediate, 46 in.; and low pressure, 76 in., with 51 in. stroke of piston. The boilers are three in number, single ended, 14 ft. 3 in. mean diameter, and 11 ft. 6 in. mean length, each having three furnaces, and constructed to bear a constant working pressure of 200 lbs., while they are also fitted with Howden's system of forced draught. An auxiliary boiler of large size is fitted for winch purposes, &c. As the steamer left the ways she was named *Knight Errant* by Mrs. J. Ernest Muir. She has been built for Messrs. Greenshields, Cowie & Co.'s well known Knight Line, of Liverpool.

City of Aberdeen.—On December 7th there was launched by Messrs. Alexander Hall & Co., Aberdeen, a trawler, built to the order of Mr. G. W. Bowman, Hull. She is a vesse of 193 tons reg ster, and has been fitted with triple-expansion engines. The vessel was named the *City of Aberdeen*.

Evone.—On December 7th the Ailsa Shipbuilding Co. launched from their yard at Troon, a steel screw steam yacht, built for Mr. W. J. Menzies, of Lucan House, Ripon, and designed by Mr. G. L. Watson, Glasgow. Her dimensions are: Length, on load-line, 153ft.; breadth, 25ft.; depth, moulded, 16ft. Her engines, which are to be fitted by Messrs. Muir & Houston Limited, Glasgow, are triple-expansion, with four cranks, having cylinders 13 in., 22 in., 23½ in., and 23½ in., with a stroke of 21 in., with one of Thom's patent water-tube boilers, from which good results are expected. The yacht is fitted with electric light throughout and a system of hot-water heating, also every modern appliance for navigation and comfort. She was gracefully christened *Evona* by Miss Eve Menzies, daughter of the owner.

Sea Hawk.—On December 8th Messrs. J. Duthie, Sons & Co., launched at Aberdeen for Mr. Charles Blethyn, Milford Haven, the steel steam trawler *Sea Hawk*, a vessel of 150 tons gross tonnage.

Skerryvore.—On December 8th the Caledonian Shipbuilding Co. launched at Dundee for the Clyde Shipping Co., Limited, Glasgow, the steel screw steamer *Skerryvore*, a vessel of about 1,200 tons gross register. Her dimensions are:—Length, 260 ft.; breadth, 33½ ft.; and depth, 16½ ft. She has been built to the highest class in the British Corporation Registry.

City of Manchester and City of Liverpool.—On December 8th Messrs. Mackie & Thomson, Govan, launched two steam fish-carriers which they have built for Messrs. Hagerup, Doughty & Co., Grimsby. The dimensions of each are:—Length, 145 ft.; breadth, 23 ft. 6 in.; depth, 11 ft. 2 in. moulded to main deck; tonnage, 286 gross. Triple-expansion engines of 700 I.H.P. will be fitted to each vessel by Messrs. Muir & Houston, Kinning Park. The vessels were named the *City of Manchester*, by Miss Balfour, of Dykeneuk, Pollokshields, and the *City of Liverpool*, by Miss Shilton, London.

Pinta.—On December 10th Messrs. A. Rodger & Co., Port-Glasgow, launched a steel screw steamer for Messrs. Robert MacAndrew & Co., London. The dimensions are:—Length, 238 ft.; breadth, 34 ft.; depth, 23 ft. 4 in.; of 1,480 tons gross, capable of carrying 2,350 tons deadweight. Triple-expansion engines will be supplied by Messrs. Hall-Brown, Buttery & Co., Govan. The steamer is a duplicate of the *Arana*, launched on October 28th by Messrs. A. Rodger & Co., for the same owners, and will be employed in their Spanish trade. The steamer was named *Pinta* by Miss Kennedy, Kilmarnock.

Adolph Andersen.—On December 11th Messrs. Carmichael, Maclean & Co. launched at Greenock a steel screw steamer of 980 tons gross, classed 100 A1 at Lloyd's, and of the following dimensions:—Length, between perpendiculars, 210 ft.; breadth, moulded, 32 ft.; depth, moulded, 16 ft. 6 in., with raised quarter-deck. She will be fitted with triple-expansion engines by Messrs. M'Kie & Baxter, Govan, having cylinders 17 in., 27½ in. and 44 in., by 33 in. stroke, with a working pressure of 160 lbs. The vessel is fitted with steam winches, steam steering gear, and all modern appliances for working the cargo. The ceremony of naming the vessel *Adolph Andersen* was gracefully performed by Mrs. John Carmichael, of Ardenlee, Greenock. The vessel has been built to the order of Messrs. The Dampskibsselskal, of Randers, under the superintendence of Captain Schubert.

Karrakatta.—On December 11th Messrs. John Scott & Co. launched at Kinghorn a beautifully modelled cargo and passenger steamer of the following dimensions:—Length, 310 ft.; breadth, 42 ft.; depth, moulded to main deck, 18 ft. 9 in.; gross tonnage, 2,091; and classed 100 A1 at Lloyd's, for the West Australian Steamship Co.: managing owners, Messrs. Bethell, Gwyn & Co. and Messrs. Trinder, Anderson & Co. She has all the latest arrangements for the quick handling of general cargoes. On the main deck are arranged cattle fittings of the latest type. The upper part of bulwark being made of doors to hinge up, gives light and ventilation to main deck when occupied by cattle. The ventilation is further improved by means of large steam fans. In the shade deck forward there is a deckhouse, with accommodation for 38 first-class passengers, ladies' rooms, dining-room, pantry, bars, &c. In large deckhouse on the shade deck aft there is accommodation for 38 second-class passengers, together with the engineers and officers. The crew are housed on main deck at stern. The music saloon (immediately over the dining saloon) and smoking-room, at after end of engine casing, are done up in walnut and marble similar to dining saloon. Immediately in front of the music saloon, on the bridge deck, is situated the chart-room and

captain's room. The boats of seamless steel, seven in number, are raised above bridge deck on beams, thus giving splendid room for promenading. Awning and weather screens are fitted all fore and aft. As the steamer left the ways she was gracefully named the *Karrakatta* by Miss Roberts, daughter of Captain Roberts, marine superintendent of the company. The steamer was launched with steam up, and proceeded to Burntisland to bunker for trial. After the launch the owners' representatives (Mr. Trinder, of Trinder, Anderson & Co., Captain Roberts and Miss Roberts, Captain and Mrs. Talboys), the builders, and friends adjourned to the office, where the usual toasts on such occasions were proposed and duly honoured. The steamer has been designed and superintended for the owners by Mr. Wotherspoon, assisted by Messrs. Weir, Talboys, and Wyles. The vessel is fitted with a set of triple-expansion engines of latest design, with large boiler power.

Lancaster and Mansfield.—On December 14th Messrs. Mackie & Thomson launched at Govan, for Messrs. Hagerup, Doughty & Co., Grimsby, two steam fleeters, named *Lancaster* and *Mansfield* respectively. The dimensions of each are 103 ft. 9 in. by 21 ft. by 11 ft.

LAUNCH.—IRISH.

Brasilia.—On November 27th Messrs. Harland & Wolff launched at Belfast the large steel screw steamer *Brasilia*, for the Hamburg-American Line. Her dimensions are 500 ft. long by 62 ft. beam, and 38 ft. deep. She will be over 11,000 tons gross, and will have accommodation for a few first-class and 600 steerage passengers, and will be fitted with all mechanical facilities for the rapid loading and discharge of cargo, as also with refrigerating machinery, and a complete installation of electric light. The propelling machinery, which has been constructed in the builders' engine-works, consists of a set of quadruple-expansion engines similiar to those of other vessels built for the same owners. The vessel has been built to the highest class of Germanischer Lloyds.

LAUNCHES.—GERMAN.

Tertia.—On November 25th a new screw steamer, built for the Steamship Co. of 1869 in Flensburg, was launched by the Flensburg Shipbuilding Co. Dimensions are—286 ft. by 39 ft. 8 in. by 19 ft. 9½ in.

Off-Shore Dock.—On December 5th the second half of the Copenhagen Dock was launched by the Flensburg Shipbuilding Co. The first half was launched four months previous. When the two halves are connected they will be towed to Copenhagen by the Switzer's Salvage Co., Copenhagen.

TRIAL TRIPS.

Enfield.—On November 22nd the steamer *Enfield*, built by Messrs. John Priestman & Co., to the order of Messrs. Charles W. Ormston & Co., of Newcastle-on-Tyne, proceeded from the Wear for her trial trip. She is a steel self-trimming cargo vessel of the following dimensions, viz. :—Length, 298 ft. 6 in. ; breadth, 40 ft. ; depth, 27 ft. 4 in. to top of trimming deck, 21 ft. 4 in. moulded. She has been constructed to the highest class of Lloyd's register, and is the second of a special design of the builders. The principal features of the design consist of an inclined deck running fore and aft, intervening between the sides of the vessel and a raised central deck. At the upper and lower extremities of the inclined deck platforms are provided, to facilitate the working of the vessel. The advantages claimed above the ordinary type of cargo vessels are small net tonnage in proportion to deadweight and cubic capacity, saving in trimming charges, and improved qualities at sea, owing to the fact that no water can be carried on deck. The engines, built by Messrs. William Allan & Co., Limited, are of the triple-expansion type, with cylinders 21 in., 25 in., and 58 in. diameter, the stroke being 39 in. Two large boilers supply steam at a pressure of 160 lbs. per square inch. After the trial, which was in every way a complete success, the vessel proceeded, under the command of Captain Larkin, to the Tyne, to load for her first voyage to Genoa.

Bingo Maru.—On Tuesday, November 23rd, the large twin-screw steamer, *Bingo Maru*, 5,825 tons gross, went down the river, and in the course of that day and Wednesday ran her speed and coal consumpt trials. During both days her machinery worked admirably, without the slightest hitch, and gave every satisfaction to the owner's representatives, who were on board. A mean speed of 14¼ knots was easily obtained, which more than realized the anticipations of Owners and Builders. The *Bingo Maru* is the fifth steamer built by Messrs. David & William Henderson & Co., Partick, for the Nippon Yusen Kaisha of Tokio, through their representative in this country, Mr. A. R. Brown, Consul for Japan, Glasgow.

Octavia.—On November 24th, the new passenger steamer *Octavia*, built by the Flensburg Shipbuilding Co., for the Hamburg Pacific Line, was taken on trial trip. This steamer has dimensions 394 ft. by 48 ft. 3 in. by 30 ft. Engines of 1,800 H.P. made a speed of 12 knots. After the trial the s.s. *Octavia* went through the Kaiser Wilhelm Canal to Hamburg to take in a full cargo for South America.

Macina.—On December 3rd the *Macina*, built by Messrs. R. Napier & Sons, Limited, for Messrs. Deves & G. Chaumet, Bordeaux, went on her trial trip on the Firth of Clyde. The *Macina* has been specially designed to suit the requirements of the owners' passenger and cargo service between France and the West Coast of Africa going 500 miles up the River Senegal to the French Soudan, and is intended to carry a large cargo, with superior accommodation for first-class passengers. The general dimensions of the steamer are :—Length, 255 ft. ; breadth, 36 ft. ; depth, 22 ft. 3 in. ; and 1,500 tons gross, built with a cellular double bottom for water ballast, a topgallant forecastle, bridge, and large deckhouse aft, and constructed under special survey to take highest class in Bureau Veritas. The upper decks and fittings are of teak, and the most modern appliances have been supplied for the efficient working of the ship, and the rapid handling of cargo. Accommodation has been provided for 32 first-class passengers, and as the steamer is intended to trade in the torpics, the cabins have been designed for abundance of ventilation. The machinery consists of a set of triple-expansion engines, having cylinders 20 in., 32 in., and 52 in. by 36 in. stroke, with two double-ended steel boilers for a working pressure of 160 lbs., and fitted with the most recent appliances for efficiency and economy. The results of the trials were ver satisfactory, the contract speed having been easily attained with the stipulated deadweight on board, and the consumpt considerably less than that guaranteed.

Cresyl.—On Saturday morning, December 4th, the s.s. *Cresyl*, a fine steel screw-steamer built by Messrs. Wm. Gray & Co., Limited, to the order of Messrs. W. Tulley & Co, of Hull, had her trial trip. She has been built to Lloyd's highest class, and is of the following dimensions :—Length over all, 312 ft. ; breadth, 43 ft. ; depth, 22 ft. 3½ in. The engines are of the triple expansion type, supplied by the Central Marine Engine Works of Wm. Gray & Co. The cylinders are 22 in., 35 in., and 59 in. in diameter, with a piston stroke of 39 in., and large steel boilers working at a pressure of 170 lbs. per square inch will give an ample supply of steam. The vessel and her machinery have been under the superintendence of Mr. Walter A. Sage, of Hull, and there were present at the trial trip Mr. W. Tulley, the managing owner ; Captain Murrell, representing the shipbuilders ; and Mr. T. Mudd, representing the engine builders. Although the weather was too foggy to make a formal trial, after the usual manœuvring of the ship for the purpose of the compass adjuster, Mr. Berry, the engines were run at over 80 revolutions per minute for a considerable time, and throughout the whole trial, which lasted over three hours, the machinery ran in an entirely satisfactory manner, there being no heating or trouble of any kind. The vessel on the completion of the trial at once proceeded to Hull to take in her first cargo.

Royston Grange.—On December 15th a further addition to the large fleet owned by Messrs. Houlder Bros. & Co., of London, has been made by the addition of the *Royston Grange*, the trial trip of which took place in Belfast Lough, having on board a numerous company, representing the owners, builders, and their friends. This is the fourth vessel built by Messrs. Workman, Clark & Co., Limited, Belfast, for Messrs. Houlder, and two more are at present in an advanced stage, one of which, the *Beacon Grange*, will shortly be launched. To suit the many requirements of the trade in which the vessel will be engaged in between London, Newport, Cardiff, South America, Australia, East and West Africa, special designs and constructions have been introduced, and extra attention given to the many details of arrangement in a vessel which will be engaged in so many

different portions of the globe. She has been built and classed to Lloyd's highest requirements under special survey, and to the Board of Trade regulations for carrying first and second class passengers. The principal dimensions are:—Length, 370 ft.; breadth, 47 ft. 6 in.; depth, 30 ft.; with a gross tonnage of 4,020, and capab e of carrying a deadweight cargo of 6,400 tons on a moderate draught. A cellular double bottom extends fore and aft, givingadditional safetyto the vessel,and affordingwith the forward and after peaks, space for about 950 tons of water ballast. Eight bulkheads subdivide the vessel into compartments, five of which are utilized for cargo purposes, for the loading and discharging of which the most complete arrangements have been made. Eleven powerful steam winches, by Messrs. Clarke Chapman, of a design and construction specially prepared for this steamer, are supplied, and the derricks and gear are adapted generally for lifting 7 tons, while provision is made for taking in weights up to 10 tons at two of the hatches, and, in addition, a large derrick for extra heavy lifts is also fitted up, so that practically any cargo can be loaded as the hatches have been prepared so as to allow large pieces to be handled, and the obstructions usual in the holds of vessels of this size have been reduced to a minimum, a system of framing to obviate this having been introduced throughout Messrs. Houlder's steamers. This is of the greatest benefit also for giving a large insulated capacity, and as most of the holds have been insulated a maximum of space is obtained for both ordinary cargo purposes and the frozen meat trade, in which she will be engaged in, on her homeward voyages, and a capacity of 11,000 tons has been obtained for this latter purpose. The work of insulating is of itself a work of large extent, and has been very successfully carried out by Messrs. Gregson & Co., of London, on the most approved principle. As in the previous vessels the refrigerators are on the carbonic gas system, and with the machinery, have been supplied and fitted up by the well-known firm of J. E. Hall, of Dartford, Kent. A chamber for stowing butter, fruit, and fish is provided, as well as one for carrying the more perishable provisions required for the passengers on the voyage. On the upper deck of the vessel are erections covering practically all that deck, with the exception of a space for the foremost and aftermost hatch. The bridge deck is about 180 ft. long, and on this deck is placed the passenger accommodation in a large house extending for the greater part of its length. The first-class staterooms, saloon, etc., are in the fore end, and are most comfortably fitted with all the modern conveniences, such as electric bells, steam heating, electric light, etc., and with hot and cold baths. Handsome framing in oak, with hand-painted panels of a chaste and elegant floral design, are introdnced in the saloon, while the upholstery is made to harmonize with the design of the room, the ceiling is handsomely panelled, and the fittings throughout electro plated, and a piano of Collard & Collard's make, is placed in a suitable position. A large smoke-room, with comfortable sofas extending along two sides, and supplied with tables, is set apart for the passengers. The second-class are also well catered for, their apartments being suitably fitted up, and with a saloon for their independent use, and having similar conveniences to the other passengers, including hot and cold baths, &c., &c. In a separate portion of the deck-house the officers of the vessel have their living rooms and saloon, which are large and comfortable. The roof of this deck-house forms a spacious promenade for the passengers in fine weather, and serves to house the lifeboats, which are placed on each side. There are many auxiliaries required in such a vessel, and these are all well provided for, principally under the forecastle, the forward end berthing the crew, while the cattlemen and others take another portion in independent rooms, steam heating being provided here also. A large number of cattle can be carried under the bridge, in all about 280 head, and permanent slingable pillars are fitted, as well as the most approved fittings that can be adopted for this purpose. An efficient water service, with means for conveniently watering the cattle is supplied, and the shipping of these is expeditiously arranged for by several gangway doors through each side of the bridge. A large condenser of Kirkcaldy make produces an abundant supply of water throughout the voyage. A very complete installation of electric lighting has been carried out by the Globe Electric Works, London, and is carried throughout the vessel to all the rooms, machinery spaces, and include arc lamps, so that work can be carried on continuously at the loading or discharging of the cargo. The navigating of the vessel has been carefully looked after, and is in all departments fully requisite for handling easily a vessel of this size. Amos & Smith supplied one of their patent steam-steering gears, controlled from the flying bridge. Arrangements for warping by steam power is provided both forward and aft, and a capstan is also provided independent of the windlass, which is one of Emerson, Walker's well-known make. Many other specialites might be mentioned including docking and steering, repeating telegraphs and all combining to make this department most complete and ensuring the utmost degree of safety and skill in the navigation. The *Royston Grange* is schooner-rigged, and has two telescopic steel masts to suit the bridges on the Manchester Canal. The fitting out of a vessel of so many capabilities, and of keeping in advance of the times, ensure a large amount of care, and on Messrs. Houlder's behalf this has been successfully carried out under the supervision of Mr. Copeland K. Etheridge, their marine superintendent. The machinery, capable of developing about 2,800 I.H.P., was also constructed at the Builders' Engine Works, to the most modern design and principle of triple-expansion engines. The cylinders are 27 in., 43 in., 72 in. and 48 in. stroke; steam is supplied from two large steel boilers at a pressure of 190 lbs., and fitted with James Howden & Co.'s forced draught. A donkey boiler for supplying steam to the auxiliary machinery at 90 lbs. is fitted in the stoke-hold. Powerful steam pumps by the best makers for feed and ballast purposes are situated on one side of the engine-room, and leaves a good clear space about the engines for free movement. The machinery department has been under the superintendence of Messrs. Esplen, Son & Swainston, of Liverpool and London. The company during the day were entertained by the builders, and returned to Belfast by the tender as the *Royston Grange* proceeded direct to Newport to coal and load for her maiden voyage, under the command of Captain J. Bennett, and at which port we have no doubt she will be visited by a large number desirous of inspecting Messrs. Houlder's latest steamer.

Mary Park.—On December 17th the *Mary Park*, built by Messrs. A. Rodger & Co., and engined by Messrs. Dunsmuir & Jackson, for the Park Steamship Co., had her official trial on the measured mile at Skelmorlie, when the satisfactory speed of 10¾ knots was attained. The *Mary Park* is an exceptionally fine cargo and cattle steamer, built to the highest class of the British Corporation. After running the mile luncheon was served at the conclusion.

Reviews.

Reed's Engineers' Handbook. By W. H. Thorn. Sunderland Thos. Reed & Co. 1897.

A work which has reached a sixteenth edition has proved fairly conclusively by the test of experience that it supplies an important want of the community, and that the community is, to a large extent at least, very well aware of the fact. The present issue of Reed's Handbook comprises three volumes. There is the book proper, which must be the chief subject of our present notice, the key to the problems contained in the principal work, and a volume of drawings. The latter are in number thirty-six. They represent the most important matters with which the engineer is concerned, and are very clearly and carefully executed. The selection comprises every drawing which the records shew to have ever been demanded of candidates for certificates, and the great experience of the editor enables him, by means of asterisks placed beside the descriptions of the plates in the index, to give the student an idea of which of the three dozen are likely to fall in his way when his testing time comes. The main volume contains everything the engineering student needs to learn from books. The rules and regulations concerning the examinations, the certificates of service, and of age, which must be produced by candidates, are detailed at the commencement of the work. Then follow a very large number of most useful problems in every subject dealt with at the examinations. These problems are succinctly worked out and lucidly explained. Where unnecessary data are given in problems with a view of confusing the unwary, the fact that such and such a piece of information has no bearing on the answer, is carefully pointed out. It is not enough to get correct answers to questions. The goal must be attained by the proper and direct road, and practice with the examples set out here will make the true path familiar and natural to the student. Practical knowledge of sea conditions is

evinced by the author at every page, but perhaps it is nowhere more apparent than in his treatment of the indicator diagram cards, where the most frequent distortions are exemplified, and the defects which cause them are pointed out. For further instruction and practice a large number of papers already set in the examinations are given, and it is to these that the key volume supplies the correct working out and answers. A number of tables are given at the end of the students' volume, and reference to the whole is facilitated by an index. It may be said, in conclusion, that those students who have not the advantage of a skilled and experienced coach for their examinations, may still hope to pass by the careful use of this volume, which will not only prove invaluable to such students, but also to those teachers who do not devote their whole attention to the instruction of candidates for these trials.

The Universal Directory of Railway Officials, 1897. London. The Directory Publishing Co., Limited. 1897.

The third issue of this annual shows that those who are responsible for the compilation are determined to make it exhaustive, and as free from error as it is possible that a manual can be which deals with so many thousands of persons in every part of the civilised globe. Those with whom it deals, too, are engaged in an occupation where promotion is ever going on with the changes that such promotion involves. Even if the members of a profession themselves may grumble that promotion is slow, those who have to keep watch and ward over it, as the makers of these directories and the compilers of army and navy lists, would be very apt to say that it is a very rapid and far-reaching process all the same.

As in the previous issue, the editor has had to go far afield to find fresh railways to be captured. The present issue contains new information as to railways in Japan and Siberia, amongst other fresh Asiatic lines, whilst Africa and South America are also being brought more completely into the net. Whilst the field is thus widening each year errors are being eliminated from the body of the book, and it may be said, once and for all, that those advertisers who wish to circularise railway men have here a mine of information ready to their hand. But, it is to railway men themselves and to statisticians that the book chiefly appeals, and these will find it a most useful publication, filled with an astonishing amount of fact and of detail.

Dynamo Attendants and their Dynamos. By Alfred Gibbings. London: Sidney Rentell & Co. 1897.

Mr. Gibbings' useful and unpretentious little work has now reached a third edition, and opportunity has been taken of the fact to undertake the work of revision, and of bringing it thoroughly up to date.

The book addresses itself to the ordinary dynamo attendant where the installation is small, and does not pretend to cater for those who are charged with the management of large central dynamo stations. Yet the hints it contains are very practical. The necessity of keeping the dynamo room clean, and free from iron and damp, is one which is not always realised, at least in practice, by some persons who are supposed to be experts in electricity, and our author professes to work below the level of experts. The clear language and simple diagrams with which he explains the tests which he suggests for locating certain faults are very admirable. In fact, in this little volume we find all the ordinary diseases of electrical dynamos, their causes, diagnosis, and treatment. Any dynamo attendant who spends his shilling in the purchase of this volume, and follows up the purchase by close study of its fifty odd pages, will find that he has made a very good investment. Where men with small electrical knowledge and experience are charged with the care of small installations, employers might do worse than buy the book for their men, if they can only find means to ensure its intelligent perusal. But generally men study most what they pay for out of their own pocket.

Practical Advice to Marine Engineers. By Charles W. Roberts. London: Whittaker & Co.

In this little book the author has attempted to give a number of practical wrinkles in regard to his duty afloat which shall be of value to the sea-going engineer. The volume commences with an account of the usual apportionment of their duties amongst the several engineers and their assistants. It tells a good deal which it is most useful for engineers, especially juniors, to know, and which is not often found in more ambitious works. As an example, we may quote the notes on the duties of firemen in regard to the feeding and cleaning of furnaces. No one ought to be placed in a position of responsibility without having some knowledge of the duties of those under him, and this, in the first part of the work, Mr. Roberts endeavours to convey. He also gives a good deal of information as to the more immediate duties of the engineer, and gives hints as to the management of machinery and the avoidance and remedying of breakdowns. One of the great objects of the engineer who aims at a front rank in his profession must be to get the maximum out of his engines with the minimum of expense. The way to do this is discussed by our author. Friction may be kept down by attention to the packing of the glands and bearings, and by care in the matter of lubrication. Again, by attention to the linking up of the engines the best work may be got out of the supply of steam, and all this is treated clearly and shortly. Much attention is directed to the management of auxiliary machinery and towards the keeping of the reserve appliances in good order and ready for immediate use on an emergency. The volume contains some sixty diagrams. It may, perhaps, be useful to our readers to add that there has been a change of publisher in regard to this—as also to the following volume—which is

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Electric Lighting for Marine Engineers. By S. F. Walker. London: Whittaker & Co.

Mr. Walker's book is now in its second edition, and it therefore has already showed itself of value to those whom it desires to instruct. This is a very practical work on what is now part of the duty of the engineering staff of every modern steamer. Hints are given on the management of electric apparatus at sea, as well in the body of the ship as in the engine-room. Useful hints are given as to the location of faults. There is a chapter on cargo and search lights. When we regard the large number of steamers that have been built for the conveyance of petroleum in bulk, and remember how vitally important for the safety of all on board it is that there should be no possibility of sparks getting to the cargo, an additional interest will attach to Mr. Walker's remarks on the use of electric light in petroleum ships. He discusses the evidence of Dr. Dupré and Professor Redwood in the case of the explosion on board the steamship *Tancarville*, when in the dry dock at Newport. Partial protection to a certain extent can be attained by the use of shunt-wound dynamos in these ships, but there are accidental combinations which would defeat even this precaution. The ship must be wired on the double wire system, a single switch and a single cut out in each cable are recommended, and these, of course, must be situate in positions where no inflammable vapour can accumulate. The liability to abrasion of the cables of portable lamps constitutes their use a danger, and thus, on these ships, hand-lamps with their own small batteries are desirable. The author directs special care in such ships to the covering of the cables, but condemns lead covering. Whatever, he thinks, may be used for the cable proper he considers that the external protection should be of jute. Jute is a good protection against the damp, and it is a very good insulator. But his final remark on the subject is perhaps the one which the engineer who goes to sea in a tanker should take most nearly to heart. After all precautions have been taken by those responsible for the installation it still remains for "the care of the apparatus to be entrusted to a careful man who understands it and appreciates its dangers." Such a man will find that his knowledge and appreciation are greatly aided by the perusal of the volume under discussion.

Naval Gunnery: a Description and History of the Fighting Equipment of a Man-of-War. By Captain H. Garbett, R.N. London: George Bell & Co. 1897.

Captain Garbett has contributed a very interesting volume to the series of Royal Navy Handbooks which are being published under the general editorship of Commander Charles Robinson, R.N. This work, as we are told at its very inception, is not intended for experts. It is written for the general public and will be valuable as aiding the outsider to take a proper and appreciative interest in the Navy. The production of this series is, at the present time, when attention is being so largely called to matters naval, most opportune.

Nothing perhaps marks the immense progress of the period covered by Her Majesty's reign more than the fact that one-third

of it had elapsed before the 7-inch Armstrong gun superseded the old-fashioned 68-pounder. Even this improved weapon, only threw a projectile of the weight of 110 lbs., a matter which to-day seems small enough. Yet we must not forget in making a comparison of this kind that mere weight of projectile, or of weapon, does not give a complete index to the improvements effected, for science, which ran us forward to the 110-ton gun of 16 in. diameter has enabled us to fall down to a weapon as practically effective, with a weight of only 46 tons and a bore of but 12 in. The vast strides which the art of gunnery has made during recent years is well shown by Captain Garbett's work. He shows us too how much beside the mere gun-tube has to be considered. The accessories in the way of carriages, ammunition-hoists, sights, magazines and protection to gunners have all needed and received a vast amount of attention and ingenuity. If these matters had not marched together the whole effect would have been completely marred.

The point to which we would wish to call the especial attention of the general public is the advantage of the breech-loading gun. It is, of course, very late in the day to do this. Foreign countries have no others. Yet its extreme superiority over the muzzle-loader in accuracy and range as well as the fact that probably muzzle-loaders would be unworkable in action owing to the fire of quick-firers, has still to be brought home to our Admiralty. It may be said that all our new ships for now some years have been fitted with breech-loading guns, and this is true.

But it is also true that there are also vessels of old types considered worth refitting by the Admiralty at the expense in some case of sums running into six figures, which are still armed with these ineffective and dangerous weapons. The Naval Review at Spithead at the Queen's celebration showed that these vessels are counted as having a certain fighting value. The reader of Captain Garbett's book will see that the value rightly assigned to vessels so armed ought to be very small indeed, and he will therefore be better able to appreciate the worth of the spectacle and the necessity for pressing forward with ships and guns to replace those which have now merely a sentimental importance.

The historical reference to the *Mary Rose*, made in the early part of the work, is important and bearing on this question. The vessel was lost in the action at Spithead, in July, 1523, and the cause of her loss was similar to that of the *Royal George*, sunk at at the same place nearly three centuries later. Both vessels were struck by sudden squalls, and heeling over, filled through their lower deck ports. Our author gives us an illustration of one of the guns recovered after more than 300 years from this ancient wreck, and it is interesting indeed to note that this is a breech-loader.

There is nothing very surprising, after all, in this interesting fact. For many of our most boasted discoveries are merely re-introductions, under more practical conditions, of old ideas. There are in the Tower of London collection old revolving pistols, if we mistake not, which also date from the sixteenth century. Another attempt was made at the time of the Crimean War to introduce the principle of breech-loading. But the idea, though correct, was crude and details had not had the advantage of development in peace before being tried under the rough tests of war. Jamming and premature explosion—now things carefully provided against—were the dangers of these weapons, and they were thrown on one side, discredited. A generation passed before we returned to them and meanwhile the Continentals, who had not had our discouragements, went ahead.

Our readers will do well, however, to study the book for themselves. We have devoted our attention to the discussion of one single point, and that one which is really only incidentally referred to in the book. The development and present condition of our system of Naval Gunnery is well traced out, and wherever explanations can be elucidated by the aid of pictures or diagrams, use has been made of the engraver and woodcutter. Enough has been said to show that Captain Garbett's book will be a very useful addition to the very useful series.

Breakdowns at Sea and how to Repair Them. By A. Ritchie Leask. London, 1897.

This is the third edition of the little volume which some three-and-a-half years ago we commended to our readers. Experience has shown that, as we anticipated, the book would appeal to the profession, and would be found to supply engineers with information of a kind which they felt they needed. It is a very practical little volume, though the questions of dealing with breakdowns are varied by the introduction of occasional yarns as to the more serious results which may attend sea casualties.

Perhaps the most serious accident short of one which leads to total loss which can befall the modern sea traveller is a broken shaft. It is certainly one which is not diminishing in frequency. It will therefore be with considerable interest that the engineer turns to that part of the work which deals with this subject. The writer very properly begins at the beginning of his subject, and seeks the causes for those constantly recurring casualties. A remark of the late Dr. Kirk is quoted to the effect that "if superintendent engineers would only see that the shafting of their steamers was kept in line, broken shafts would never be heard of." The author makes the comment on this remark which would instinctively rise to the lips of any person of experience who read it. Of course they would not occur *if the bearings were always kept true*. But how is truth to be attained and preserved? Dr. Kirk wisely refrained from any attempt to settle that. The fact is that a ship is not, and cannot be absolutely rigid and takes different shapes under varying conditions, as well as of cargo, as of weather and sea. Every time such alteration takes place, fresh strains must be put upon the shafting. Then comes fracture. The only possible means that can be taken to avoid fracture is by making the shafting capable of giving way to the strain without injury. That must be achieved either by the introduction of flexible couplings or by making the shaft hollow, and so getting rid of the core which acts as a fulcrum upon which the exterior may be bent. But for some reason hollow shafting does not seem to be in favour. Another point which seems to tend to the manufacture of breakdowns is the small amount of bearing surface allowed in some marine engines. That is of course defective design. Then, having regarded these matters, Mr. Leask tells us of how apparently impossible feats have been performed by engineers with poor appliances, scant assistance, limited space, and a rolling, pitching workshop. It is only by the study of cases that have occurred in this past that light can be thrown upon those that will occur in the future, for no two accidents are exactly alike. But readiness of resource is cultivated by attention to the experience of others.

Triple Expansion Engines and Boilers. By A. Ritchie Leask. London, 1897.

This volume is by the same author as that which we have just noticed, and like it, it is in a third edition. Advantage has been taken of this opportunity to revise the book and bring it down to date. For it deals with a subject which is pre-eminently a progressive one. Some little interest will be excited by the frontispiece to this volume. It is a drawing of the engines of the ill-fated P. & O. steamer *Aden*. They are of the ordinary triple-expansion type. Some attention is paid to quadruples as well as to triples, and the water-tube boiler has not been neglected. The management of high-pressure engines, boilers, and of auxiliary machinery is practically dealt with, and, we may say, that, as a manual of every-day practice this book will be found exceedingly useful.

Steam Boilers. By George Halliday. London: Edwin Arnold & Co. 1897.

This book is one of the Practical Science Manuals of Messrs. Arnold's series for the use of students and workmen. As we are told in the preface, the design of the author has been to guide the student, or workman, "into the habit of digesting the results of experiments and trials of boilers as given in the technical press." This is certainly a useful aim. But the author has done something more than he claims, or even than his title would lead one to expect. Perhaps he could not have set about his task without building a larger foundation than the actual superstructure occupies. At all events he has begun by tracing out the development of the ordinary types of land boilers now in common use from their almost legendary ancestors, and affords statistics of the supposed number in existence, with tables of explosions. These are most interesting. From them it would appear—as anyone who follows the subject would expect—that boiler explosions are about as rare as accidents on British railways or British mail boats. Then he explains the theory of combustion shortly and lucidly, and proceeds to discuss, with formulæ, the evaporative power of fuel. The importance of the provision of proper air spaces in the construction of

furnaces is dwelt upon. Then he goes into the explanation of the circulation of heat and the vexed question of draught. The latter is emphasised by the citing of many modern instances regarding the working of recent steamers. The mode of constructing boilers is gone into, and the danger of incrustation is pointed out. Thus we are led to see the use of the various auxiliary appliances whereby a pure feed is rendered possible in modern installations. Here, too, are treated such matters as Green's Economisers, which so truly fulfil their claims and are so largely used by steam users on land. Then there is a discussion of the designs and principles of a very large number of the types of water-tube boilers which are now before the public. The reader is shown very clearly that the introduction of all this auxiliary machinery alone enabled the ordinary boilers to withstand the high pressures of to-day, and that its absence was largely the cause of the failure of the early attempts to introduce water-tube boilers. These failures were sometimes postponed for a trip or so. The fact that at first all went well seemed to justify the theory of the inventors. But the subsequent failure showed that their work was unable to resist the unfavourable conditions which ensued under working conditions at sea. Now practice is more nearly approximating to those of experiment and of theory. The book will be read with great interest, and the remarks which are made on the great boiler question which is agitating the technical miud at the present day are most *apropos*.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

AUTOMATIC SAFETY STOP VALVE.

To the Editor of the Marine Engineer.

Dear Sir,—We noted your remarks, in a copy of your paper that you kindly sent us a fortnight ago, *re* the "Foster" Valve, and are sorry we have been unable earlier to avail ourselves of your suggestion that we should contribute something further with respect to our claims as to the advantage of this valve as an automatic safety appliance over the mechanically actuated valve illustrated along with it on the same page.

May we now say that we think our valve is very much superior in many respects; it is so made that it cannot fail to act promptly if a fracture occurs; it may be set to act, where necessary, with a variation of pressure of a few pounds, also arranged to act mechanically, if so required, as shown by the illustration in your December number.

In ordinary use the valve does not interfere in any way with the regular passage of steam, as each of the two seats are equal in area to the size of pipe for which the valve is supplied.

The strong feature of this valve is that it acts quite automatically, and much more promptly than could any valve operated by hand, a few seconds must elapse in closing such a valve even when there was anyone at hand to close it immediately an accident occurred.

This is just the point involved, and is all in favour of the "Foster" Valve, our experience being that where so-called safety appliances are left to depend, for their application, upon human forethought, they are generally overlooked altogether when the exigencies of the case require immediate action.

You will no doubt call to mind many cases where the simple turning of a lever, pulling a cord or the closing of a cock would have prevented a calamity, but where, in the confusion of the moment, this simple duty has been overlooked.

The valve you illustrate would not, we think, close readily under steam.

We remain, dear Sir,

Your very obedient servants,

W. H. Bailey & Co., Limited

December 14th, 1897.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from November 11th to December 7th, 1897.

25956 C. Endruweit. Packing for piston flanges.
25985 W. Whitehead. Rotary engine.
26049 A. Misch. Valve gear.
26055 J. Whitehead. Launching torpedoes.
26076 G. L. van Gink. Rotary expansion engines.
26080 T. Bradley. Hand-power drilling machines.
26084 J. Brohan. Ships.
26128 R. S. Dobson. Propeller.
26135 P. Thom. Valves.
26273 D. Macdonald. Steam generators.
26289 T. Drummond. Cowls and ventilators.
26386 J. T. Brown. Measuring distances at sea.
26444 B. Burleigh. Collapsible boats.
26472 J. Innes. Steamship propeller and gear.
26477 J. T. Wood. Propeller bearings.
26478 T. F. Adamson and E. Clarke. Trawl nets.
26497 T. Ansboro and J. Fairie. Bulkhead doors.
26502 H. Workman. Tube expanders.
26503 I. Barton. Fixing valves.
26519 G. Lentz. Elements for water-tube boilers.
26553 C. A. Parsons. Turbines.
26573 W. Caddick and C. Oliver. Boilers.
26576 The James' Syndicate, Limited. Submarine sentry.
26578 G. W. Mallet. Ships' course indicator.
26609 W. Cook. Beams for ships' hatchway sides.
26643 A. and M. R. Puls. Submarine vessels.
26650 A. Jourdanet and J. P. Gauthier. Turbines.
26704 S. Allcock. Fishing bait.
26705 V. Collyer, jun., and H. O. Bridgewater. Propelling vessels.
26782 J. Birkett. Ships.
26783 J. Birkett. Ships.
26798 G. Cuccotti. Bearings for marine engines.
26823 D. T. Piot. Steam generators.
26858 C. D. Holmes. Floating metallic packing.
26867 J. S. Macarthur. Antifouling composition.
26968 C. Hellyer. Otter trawl boards.
26969 J. Vicars, sen., T. Vicars, and J. Vicars, jun. Mechanical stokers.
27001 W. G. Gooch. Lubricators.
27040 E. S. Norris. Construction of unsinkable boats.
27045 W. J. Roberts and J. R. Jones. Utilising tidal power.
27047 M. M. J. O. O'Conor. Raising sunken ships.
27089 E. Crawshaw. Centrifugal pump.
27095 A. S. Brown. Indicating speed of engines.
27096 W. P. Hoskins. Folding the berths of ships.
27119 J. E. Holmes. Locating sounds at sea.
27125 C. E. Smith (E. Smith, Cape Colony). Welded iron tubes.
27179 P. M. Justice (The Société Anonyme du Temple, France). Boilers.
27180 A. Vickers and L. Silverman. Steam generators.
27286 A. W. Montgomery Moore. Closing bulkhead doors.
27289 R. F. C. Keats. Regulating engine speed.
27293 R. C. Westphalen. Vessel-propelling mechanism.
27335 T. Christie. Self-levelling ships berths.
27338 H. A. Bridge. Gauge glass mountings.
27356 J. W. Couchman. Oars.
27362 R. Fenton. Propelling ships.
27412 G. F. Redfern (La Societe Boyer et Conti, France). Rotary engines.
27444 J. W. Rockliffe. Securing ships' hatch covers.
27459 P. H. I. Ewan. Propelling vessels.
27466 E. J. C. Christie, G. T. Beilby, and A. Barr. Sheathing for war vessels.
27484 J. F. Walters. Steam generators.
27553 E. Lize. Steam generator.
27556 C. Bergman and O. Richter. Self-lubricating bearings.
27577 S. O. Pearson. Valve.
27581 W. S. Webb. Valve.
27586 H. H. Strongitharm and The United Kingdom Self-Adjusting Anti-Friction Metallic Packing Syndicate Limited. Metallic packing.
27613 W. H. Bushell and L. R. S. Tomalin. Boilers.

27634 G. E. Turner. Steam generators.
27658 H. Scales. Funnels.
27772 H. R. Shaw. Boats.
27778 T. J. Bennett and W. F. Thomas. Piston.
27814 T. N. Robinson. Horizontal shaft bearings.
27815 T. N. Robinson. Vertical shaft bearings.

BOARD OF TRADE EXAMINATIONS.

NOTE.—1C denotes First Class; 2C, Second Class.

October 16th, 1897 (*Continued*)

Robertson, J. A. 2C Greenock
Scott, J. T. .... 1C N.Shields
Scullard, H.... 2C ,,
Smith, E. R. .. 2C ,,
Stothard, R. S. 2C ,,
Waterhouse, H. 1C Liverpool
Wawn, T. N. .. 1C N.Shields
West, Macdonald 1C Liverpool

October 23rd, 1897.

Banks, A..... 2C W.H'pool
Bell, F..... 2C N Shields
Bliss, F. C. .... 1C Cardiff
Burdick, A. G.. 1C London
Casebourne, A.E. 1C W.H'pool
Chalmers, H. .. 1C Glasgow
Clark, A..... 2C ,,
Clucas, R. E. .. 2C Liverpool
Colquhoun, J... 1C Glasgow
Crawford, J.... 1C ,,
Crooks, J. R. .. 2C W.H'pool
Davies, J. R. .. 2C ,,
Devlin, A..... 2C Glasgow
Dilks, A. T..... 1C London
Dockar, J. J. R. 2C N.Shields
Doms, G. J..... 1C London
Forster, Wm. E. 1C Liverpool
Fraser, J. W. .. 2C Glasgow
Glover, T..... 2C London
Grant, T. F.... 1C Glasgow
Guthrie, W.... 2C ,,
Hails, H. F. .. 1C N.Shields
Hopper, A. E... 1C W.Hpool
Houston, W. H. 1C Liverpool
Inglis, W. T. .. 2C Glasgow
Irvine, S. F. D. 1C ,,
Johns, W. H. .. 2C Cardiff
Kidd, H. F..... 1C N.Shields
Kitchen, T. .... 1C ,,
Macintyre, D... 1C Glasgow
MacLennan, A. 2C ,,
Martin, D..... 2C ,,
McNab, J..... 2C ,,
Miles, H..... 2C London
Mould, R. A. .. 2C Liverpool
Pengelly, A..... 1C Cardiff
Plews, W. S.... 2C ,,
Ramsey, R. .... 1C W.H'pool
Ross, Frank R. 1C Liverpool
Scott, R. ..... 2C Glasgow
Smith, Colin H. 1C Liverpool
Stephenson, C.. 1C London
Treliving, J. W. 2C Cardiff
Walton, J..... 2C N.Shields
White, T. A.... 1C ,,
Wilford, F. A... 2C W.H'pool

October 30th, 1897.

Bedford, H..... 1C Hull
Brown, G. R. .. 1C N.Shields
Chapman, H. E. 1C London
Clark, F. R.... 2C ,,
Crichton, A. T. 2C Aberdeen
Cutter, W. .... 1C N.Shields
Davies, E. L. .. 2C Liverpool
Elliott, J. R. .. 2C N.Shields
Faulkner, F.... 2C Hull
Gordon, R. J. .. 1C London
Hepburn, J..... 1C Aberdeen
Hepple, H. C... 2C N.Shields
Maggs, C. J..... 1C Bristol
McLean, J. . .. 1C Aberdeen
Neilson, Wm. T. 2C Liverpool
Nichols, T. .... 2C Hull
Rae, John Y. .. 1C Liverpool
Richardson, G.R. 1C S'nd'land
Ritchie, G. .... 2C Aberdeen
Ruxton, D. F... 1C Liverpool
Scott, J. J. .... 1C N.Shields
Shinie, F..... 2C Aberdeen
Smith, W. H... 2C ,,
Soppet, H. W... 1C N.Shields
Soulsby, C. H.. 2C S'nd'land
Stonehewer, H. 2C London
Tagg, T. ..... 2C ,,
Tarn, E. W.... 1C N.Shields
White, John.... 2C Liverpool

November 6th, 1897.

Anderson, C.... 2C Dublin
Clark, H. C..... 2C Leith
Daff, E. W..... 1C London
Davies, E. L. .. 2C Liverpool
Day, F. ..... 2C N.Shields
Drake, F. . .... 1C London
Evans, L. M. .. 2C Cardiff
Gourlay, W. E. 1C Glasgow
Hughes, E. H... 2C Dublin
Hutchins, E. E. 2C Cardiff
Jackson, G. A. 2C Glasgow
Jones, J. ..... 2C ,,
Lawson, A. .... 2C London
Liston, T..... 2C Glasgow
Liston, W. S. .. 2C ,,
MacLeod, N.... 1C ,,
Marshall, C..... 2C ,,
McIlroy, J. G... 2C N.Shields
McNab, H. H... 2C Leith
Morgan, J. C... 2C Cardiff
Neilson, Wm. T. 2C Liverpool
Nisbet, A..... 2C Leith
Patterson, J. R. 1C Glasgow
Phelps, J. D. .. 2C Cardiff
Power, J..... 2C ,,
Rea, J. Y..... 1C Liverpool
Reid, J..... 1C Glasgow
Richardson, R.. 1C N.Shields
Robertson, T... 2C Glasgow
Ruxton, D. T .. 1C Liverpool
Schulter, J. H.. 2C London
Scurr, J. G..... 2C N.Shields
Terry, E..... 2C ,,
Walker, J..... 1C Leith
Waters, W. .... 1C Glasgow
White, F. A.... 2C London
White, John. .. 2C Liverpool
Wood, R..... 1C Leith

November 13th, 1897.

Allison, J. H. .. 1C Greenock
Angus, J..... 1C N.Shields
Barrass, J. W.. 2C ,,
Birlison, R..... 2C ,,
Cameron, P.... 1C ,,
Carnie, W. .... 2C Leith
Carter, T. J.... 1C N.Shields
Cass, J. F..... 1C ,,
Chivers, A W A. 2C London
Cockrill, E. W.. 2C Hull
Dickie, D. M. .. 2C Greenock
Douglas, A. .... 1C ,,
Duckworth, E.T. 2C N.Shields
Ewart, F..... 2C Liverpool
Fothergill, R.M. 2C N.Shields
Hails, M. E.... 1C ,,
Henshaw, J.... 1C Liverpool
Hoare, P. H. V. 2C London
Kemp, W. L. .. 2C Hull
Lugg, E. A. .... 2C N.Shields
McAllister, J. E. 1C Greenock
Miller, T..... 1C ,,
Paterson, N.... 2C ,,
Pickering, J. W. 2C Liverpool
Preston, E. H.. 2C N.Shields
Proctor, D. J... 2C Hull
Roberts, J W.. 1C ,,
Smith, A. E. .. 1C ,,
Tatam, G. R. .. 2C Liverpool
Thompson J. H. 1C N.Shields
Townsend, H... 2C ,,
Whyte, G. L. .. 2C Liverpool
Willis, A. R.... 2C ,,
Woodend, J.... 1C ,,
Wright, R..... 1C Greenock

November 20th, 1897.

Brownlee, T. M. 2C W.H'pool
Burrows, R. R. 1C ,,
Cameron, W. .. 2C Glasgow
Carmichael, W. 1C ,,
Colville, J..... 2C ,,
Couper, A. .... 1C ,,
Crawford, T. H. 1C London
Dixon, W. H. .. 1C ,,
Findlay, T. C... 1C Glasgow
Galloway, W. T. 1C W.H'pool
Gibbs, H. E. .. 2C London
Gilroy, E..... 2C Glasgow
Hall, E. M..... 1C Liverpool
Hampton, W. C. 1C London
Higgins, B. .... 2C Glasgow
Hodgson, R.... 2C W.H'pool
Hunter, R. C. .. 2C Cardiff
Hutcheon, J. L. 1C Dundee
Jenkins, W..... 1C Plymouth
John, E. T. .... 1C Cardiff
Kehoe, J. J..... 1C London
Kilpatrick, D... 2C ,,
Laurenson, G.H. 2C Liverpool
Lewis, F. .. ... 2C Cardiff
Macdonald, W.N 1C Glasgow
Macintyre, W.. 1C ,,
Martyn, E. .... 2C Plymouth
McClymont, H. 2C Glasgow
McKinley, A. .. 2C ,,
McLellan, R. A. 2C Liverpool
McWilliam, A.. 2C Glasgow
Miller, H..... 1C ,,
Parkyn, C. G... 1C Cardiff
Pengelly, T..... 2C ,,
Rickardson, W. 1C W.H'pool
Robertson, R. G. 2C Glasgow
Salter, J. A.... 1C Liverpool
Silverlocks, C.H. 2C ,,
Sinclair, F. C... 1C Dundee
Taylor, R..... 2C Glasgow
Watson, H. S... 1C London
Wright, M..... 2C Glasgow

November 27th, 1897.

Bartle, G. W... 1C London
Baskerville, C.H. 1C Liverpool
Casely, R..... 2C London
Cuthbert, G. G. 2C N.Shields
Davie, A. B. C. 1C London
Hope, T. ..... 1C N.Shields
Jones, John M.. 2C Liverpool
Kasanova, F. .. 2C London
Lang, C. M..... 1C Aberdeen
Mackenzie, K... 1C London
Mackie, R. .... 1C Aberdeen
Mahoney, Philip 2C Liverpool
McAdam, John . 2C ,,
Murdoch, R. B. 2C ,,
Palmer, D. .... 2C N.Shields
Palmer, F. W.. 1C S'nd'land
Philip, L..... 2C Aberdeen
Potts, A. M.... 2C S'nd'land
Powell, W. A... 2C London
Shilston, R. D. . 1C N.Shields
Telford, A. .... 2C ,,
Vannyvel, F. J. 1C London
Veness, A. T. .. 2C ,,
Walls, Wm. J... 2C Liverpool

December 4th, 1897.

Ambler, Thomas 2C Liverpool
Armstrong, J... 1C ,,
Ayers, John. W. 1C N.Shields
Banks, G. H. .. 2C London
Bryant, E. E... 1C N.Shields
Buchanan, D... 1C Liverpool
Cairns, David.. 2C Glasgow
Chaddock, R. J. 2C Liverpool
Davey, C. W... 2C London
Donald, Geo. .. 2C Cardiff
Dunn, Wm. H. 2C ,,
Fisken, William 2C Glasgow
Forster, John T. 2C N.Shields
Gentle, Robert . 2C Glasgow
Gentles, Thomas 1C ,,
Gilligan, Robert 2C ,,
Guppy, Ernest.. 2C Falmouth
Harvey, G. F... 2C N.Shields
Hastings, H. T. 2C London
Henderson, E. . 2C Glasgow
Henderson, J... 1C N.Shields
Hodgson, Henry 1C Liverpool
James, Harry.. 2C London
Jones, T. L..... 2C ,,
Lewis, Henry T. 2C ,,
Maude, Charles 2C Liverpool
McLachlan, G.. 1C Glasgow
Munro, C. D. .. 1C ,,
Pemberton, H.. 1C London
Raeside, John.. 2C Glasgow
Rimer, George . 2C N.Shields
Roberts, W. M. 2C Liverpool
Simms, Daniel . 1C N.Shields
Sprott, R. C. .. 1C Liverpool
Stewart, W. M.. 2C ,,
Sullivan, John . 2C Cardiff
Thompson, W.S. 1C Glasgow
Whitehead, A.C. 2C ,,
Whyte, O. B. .. 1C Leith
Williams, A. C. 2C Cardiff
Williams, G. T. 2C ,,

December 11th, 1897.

Beith, J. ..... 2C London
Bellhouse, C. .. 2C Liverpool
Blacklock, J. W. 2C N.Shields
Clark, Wm. H. . 1C Liverpool
Clarke, Hugh P. 2C ,,
De Haan, J. H. 1C London
Dobson, J. .... 2C N.Shields
Fleming, Arthur 2C Liverpool
Hosking, H. T. 1C London
Johannidis, J.R. 2C Liverpool
Little, W. S.... 1C ,,
Miles, Ernest C. 1C ,,
Morgan, Wm. A. 1C ,,
Munro, H. .... 2C N.Shields
Rogers, W. A... 2C London
Rome, George S. 2C Liverpool
Simpson, H.... 2C N.Shields
Tennant, J. E.. 2C ,,
Weaver, C. A. E. 2C London
White, W..... 2C ,,

The Marine Engineer.

LONDON, FEBRUARY 1, 1898.

THE protection of iron or steel from corrosion resulting in rust is a subject of the greatest importance to shipowners and engineers, and it would appear that there is much ignorance as to the essential conditions that should be fulfilled by an ideal covering on iron and steel to most perfectly resist corrosion. The general idea would, no doubt, be that such protection should be afforded by paint, and that the best of such paint for the purpose should be one of the greatest density and covering power, that is, with the largest proportion of pigment or finely pulverized mineral matter to give the material body. It would appear now to be recognised that a pigment possesses no protective value in itself, and that, therefore, the protective value of any paint would depend entirely upon the liquid medium with which the mineral matter is mixed. It would then follow as a natural conclusion that perchance the admixture of a mineral pigment with the essentially protective medium is in itself a mistake, and upon reflection this appears to be the case. All mineral matter in minute subdivision is itself porous, and must further, as it is only in suspension in the medium, tend to make the latter open and porous in its character. It is noted that the time of drying in various pigments differs greatly without any variation in the proportion of a drier therewith, and as no chemical change has been discovered to explain such variation, we suggest that it is due to the more or less porous character of the mixed paint, and that, therefore, such porosity due to the pigment exist. Besides this argument as to efficiency as a protector, the mineral item of the paint is an important part of its cost, and why should that be paid for which does not add in any way to the protective qualities? The deduction then leads to the conclusion that the medium or vehicle of a paint such as an oil or varnish would itself alone be the proper material for most efficient and cheap protection from rust. But linseed oil, raw or boiled, is too porous in itself to be an efficient protection from rust. Varnishes are much less porous, and thus more efficient as a protective coating, but being bodies liable to extreme contraction in drying they are apt to crack. An ideal oil varnish has thus yet, we fear, to be produced. This, if possible, either by evaporation or chemical action, should dry to a moisture and acid proof film, adhering strongly to the metal, and without tendency to chip or crack. As colour is of little consequence for such a purpose, the materials of tar, pitch, or asphaltum, or rather suitable preparations from one or other of these, would seem to offer the best field for experiment for production of an ideal protective varnish or paint. We are aware of a ship's bottom having been successfully protected by an absolute coating of a preparation of asphalte and bitumen.

WE are glad to see that our readers are kindly assisting us in ventilating such various means as already exist for the prevention of serious disaster following the bursting of a main steam pipe consequent on damages or shock such as occurred in the disaster to the *Lynx* and *Thrasher*. We publish on another page an instantaneous closing check valve, introduced by Messrs. Bryan, Donkin & Co., Limited, for this purpose. So far, the devices put forward by our readers for the purpose are of only two distinct classes—those that operate instantaneously by external pull or push from what is deemed a safe distance from the explosion and those that automatically operate and are self-closing by any extreme rush of steam. It would appear that public opinion is, so far, pretty evenly divided between the relative advantages and disadvantages of both these classes of valves. Those interested in one class can readily point out the possible, and, to them, probable, disadvantages of the other, and we still are without any suggested device that will avoid the possible disadvantages of either. The disadvantage pointed out for the automatic self-closing check valve, which operates by an excessive rush of steam or diminution of pressure beyond the valve, is that these conditions might occur in times of urgent call upon the boilers for an abnormal increase of speed, and the flow of steam would be checked at a moment of great emergency. It is open to proof, however, by the advocates of the automatic valves that no increased flow of steam or tendency to diminution of pressure so produced at even the largest demand from the engine, would suffice to operate such a self-closing valve if sufficiently held in check by a spring or counter-weight. On the other hand, the valve, depending for its operation upon outside attention, is open to the charge that no one might be handy to the point of operation when the emergency arose. If the point of operation were in the engine-room, it might be obscured or unattainable by reason of the explosion itself; or, if the point were on deck entirely detached from the engine-room, the operator might not realize the emergency in time to give effectual relief. This seems to be a point that can only be settled by actual experience, and this system, as a principle, has, so far, been the one adopted by the only Government, that is, the Danish Government, which has, so far, legislated on the

subject for the protection of life. Perhaps a combination of the principles of both these classes of safety devices would be the greatest factor for safety. Or, alternatively, it appears to us that the sudden and, as we term it, shocking release of pressure due to an explosion, could well be differentiated in its effects upon an automatic-closing valve from the mere partial diminution or extreme velocity of current of steam due to emergency draft on the supply of steam. The self-closing valve might be normally entirely out of the way of the passing steam current, and be only brought into it for self-closing by virtue of the shock of the unretarded blow of the whole contents of the steam pipe after explosion beyond the valve. We think we have not yet reached finality in the best description of the device for the purpose. Here is scope for the ingenuity of sea-going engineers in their periods of leisure on watch.

It is to be hoped that the result of one of the most bitter struggles between labour and employers—the proximate termination of which we are most happy to note, in the only way that could have been anticipated, where the absolute control of workshops were in question, will have taught several beneficial lessons to the employers. They will have found that, with modern tools of precision, youths and nominally unskilled labourers can very soon be taught to rival and out-distance the production of high-priced Union men, where the latter are controlled by the tyrannous unwritten law of the Unions, that production is to be limited, by their false protectionist system, to that of the inert and unskilled workmen. Further, the employers should remove for the future the heavy financial chain that have rendered so many men unwilling slaves to the arbitrary commands of the managers of their Union executives. What is now wanted at once is a strong financial benefit society open to all, from which joining members may obtain all the benefits of assistance when out of work, superannuation, burial money, &c., and the funds of which shall be economically managed as in the best insurance societies, so as to reduce subscriptions to such a small amount as they have never yet dreamt of, such funds to be available only for the legitimate insurance objects of the society. Mr. W. H. Maudslay has elaborated a splendid scheme of this kind, in which it is even suggested that subscribers to such a fund should have it in their power, at any time, to withdraw their funds on what would probably have to be arranged as a liberal surrender value, to use such funds, if they chose, for the purpose of a trade strike. But it is obvious that, though the subscribing member would thus be left entirely his own master as to the use of such accumulated funds as he may have placed in such society towards superannuation, he would better realize what he is doing if he had to withdraw his cash and surrender his claim to superannuation benefits before it became available for fighting. As it is now, he may have lost his contingent benefit by the dispersal of the accumulated fund without realizing that he has done so. Let the Unions be either a true Benefit Society, managed economically at 4 per cent. or 5 per cent. of the income, and without power to divert the funds to other purposes, or let them be fighting societies, with funds solely subscribed for that purpose. They cannot honestly or efficiently be both. If the men don't or won't understand this, let the employers commence to organize such societies for them. It would not hurt the employers to actually start, *pari passu*, with a true Benefit Society—a frankly denominated Strike Society, so long as the men frankly recognize what they are doing with their money, each man to have a right to withdraw his strike money before a strike is declared if he disapproved of such strike.

At last, at the moment of going to press, we are able to record that an acceptable arrangement in the disputed points in the engineers' strike has been made. The manifesto issued by the strike leaders is very candid as to the obvious reasons that the men have for accepting the arrangements made by their leaders. The pity of it is that these arrangements might have been accepted by the men long ago. The employers have obtained all the points they were fighting for, and of necessity this must have been so from the beginning, as the control of their own works and the mode of carrying on such works was a vital necessity to their existence, subject to a due regard to the welfare of their workmen and the legitimate functions of Trade Unions, with their insurance benefits to the aged and unemployed. The representatives of the workmen have accepted the terms of agreement already agreed to by the employers, subject only to added notes which are to be read with their respective clauses, and which are nothing more than explanations of what was originally meant, or what was not intended to be meant, by the clauses of agreement put forward some time ago for present and future relations between employers and their workmen. Twenty-nine weeks of struggle and disturbance in the engineering and allied trades have resulted, then, only in the withdrawal by the men of their absurd and undesired reduction of working hours to 48 in the week, and in a definition of the only terms upon which the federated employers consider it worth their while to keep open their works. If the men cannot see the folly of it all by this time, they must be blind indeed. The sixth clause appears to us to be the most important to the

beneficial future of the engineering trade, and the consequent prosperity of the workmen, viz., the freedom and entire discretion in the hands of the employers to appoint such men as they consider suitable for the working of their machine tools and the conditions under which such tools shall be worked. The output from all tools where trades unionism has been rampant has been long artificially restricted and hampered, much to the detriment of production generally and of our rivalship as producers with foreign countries, and if this sorry and protracted struggle results in clearing this obstructive fallacy from the minds of the men, or at any rate from their power to interfere, the country at large will be the gainer. The clear acknowledgment that piecework, fixed as to price between the employers and workmen interested, is no injustice to labour, and that, whilst miminum prices should enable a workman of average efficiency to earn a usual wage, a man of marked ability should be enabled to earn a proportionately larger wage, is also a brilliant result from a conflict which we hope is now at rest for many years.

THE RADIO MUNDAL EVAPORATOR.

CONSIDERABLE efforts appear to be made by engineers in order to improve what has now become one of the essential elements in the machinery of our ships, viz., the evaporator. The variety in the design of the devices of this nature at present on the market is considerable, and still novelties are forthcoming from month to month, in which some special combination of advantages are claimed, which it is stated in most cases have not previously obtained.

We have pleasure in bringing to the notice of our readers the Radio Mundal Evaporator, which has been placed on the market by Messrs. Willcox Brothers, of 68, John Street, Sunderland.

The essential principle involved in the function of this device is, that by arranging the heating surface in a special manner, the deposit which occurs on the heating surface can be periodically removed in a simple and efficacious way, so that its formation into hard scale, which would necessitate removal by means of chipping hammers, is entirely avoided.

It is claimed that, besides the efficiency which results from clean heating surface, the great loss of time and money attending the cleaning of evaporators, where scaling is necessary, is entirely avoided, and further, the consequent wear and tear in such an operation is obviated.

We understand that besides the main objects kept in view in the designing of this device, have been the saving of time usually occupied in opening out and scaling evaporators, and the saving of space by providing a smaller amount of heating surface than usual, which can be readily kept clean, and which will necessarily do the same duty, than a larger amount of heating surface which is always covered with scale.

In the adjoining illustrations of this device it will be noticed that Fig. 1 is a front elevation of evaporator, with the heating chamber door removed, showing the heating elements in place on the left-hand side, and with them removed on the right-hand side. Fig. 2 is a side elevation partly sectional, and Fig. 3 is a side elevation, showing the door and heaters removed by the lifting gear.

The heating elements or heaters C, are semi-circular gun-metal castings, having flat sides stayed together by internal ribs, which form a continuous passage for the steam from inlet to outlet. These heaters are arranged parallel to one another, and are connected to the hollow door which closes the heating chamber.

In the spaces between the heaters a series of scrapers are arranged, which are carried by a shaft,

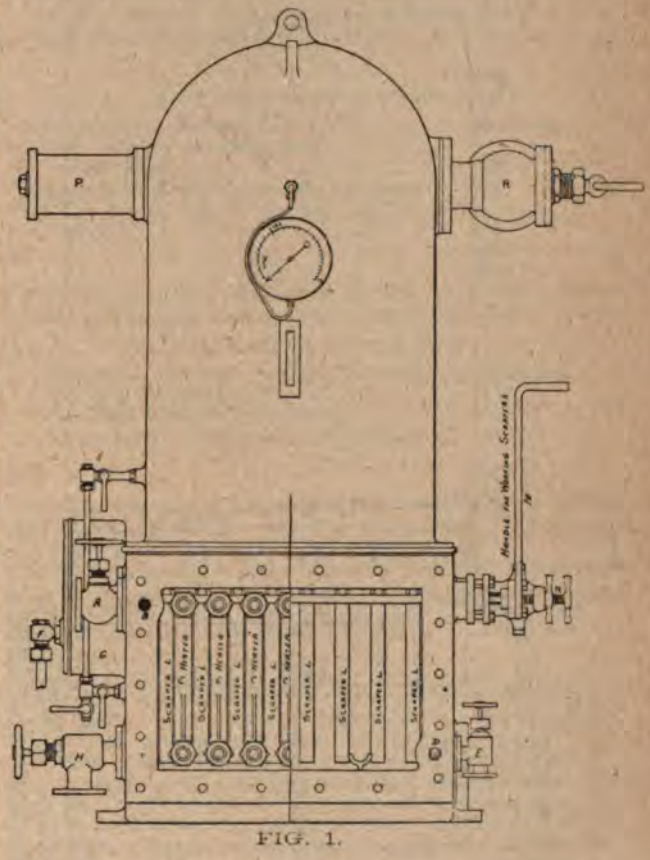


FIG. 1.

and are so adapted that by revolving the shaft by means of the handle M through half a revolution, they pass over the whole of the heating surface on the sides of the heaters and remove any deposit and prevent scale from forming. The scrapers are kept up to the sides of the heaters by means of the adjusting screw N, Figs. 1 and 3.

The steam for obtaining the heat for evaporation is taken from the boiler, and entering at the stop valve A, Fig. 1, passes through the port B into the door, and then through each heater in turn, finally passing through the drain valve E to the hot well.

The feed-water is taken from the circulating pump discharge, and is admitted by gravity when working under a vacuum through the valve F, Fig. 1, th

water level being regulated by means of an automatic cock placed in the valve-box, Fig. 1.

By arranging the heaters as shown and providing a circulating pocket, K, Fig. 2, good circulation is obtained, which, combined with a large area of water plane, facilitates the rapid generation of steam without risk of priming.

A large brining and blow-off valve is fitted, also

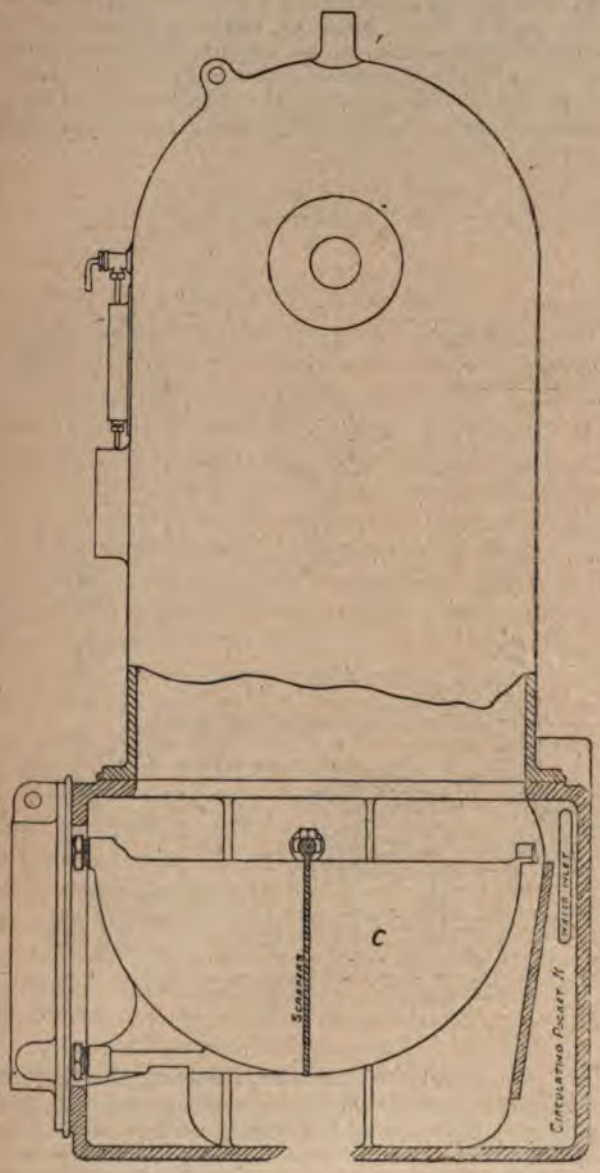


Fig 2.

a cleaning door for removing the deposit which is collected on the bottom of the evaporator.

Should scale have been allowed to form through neglect in originally using the scrapers, by removing the heaters bodily with the door by means of lifting gear, as shown in Fig. 3; the heating surface is so arranged that it can be readily cleaned with chisel scrapers, no hammering, with its destructive effects, being necessary. We may mention that a half-size model of a 20-ton evaporator, ordered by Messrs. W. and T. W. Pinkney for their s.s. *Nascongo* is being exhibited by Messrs. Willcox Bros. on their

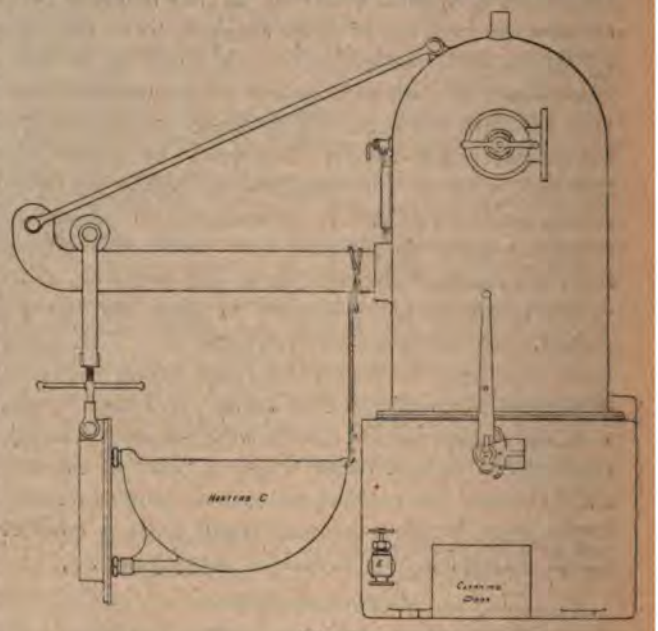


Fig 3.

stand at the Sunderland Engineering Exhibition, and they inform us that their invention has been very favourably received, and is being included in the specifications of many new vessels.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The Union Company

Not only disposed of the *Athenian*, as I mentioned in my last set of Notes, but also of the mail steamer *Tartar*, in consequence of the Klondike demand. The *Tartar* was built as recently as the year 1883, on the Clyde, by Messrs. Aitken & Mansel, and is a vessel of 4,339 tons gross register. Her engines were constructed by Messrs. J. and G. Thomson, of Glasgow, and were at first of the compound type. In 1888, however, they were converted into three-cylinder triples by Messrs. T. Richardson & Sons, of Hartlepool, and at the same time the vessel was given a new set of boilers. Both these vessels then are quite modern, and have recently been employed in the Cape Mail service. The Union Company, by this proceeding, has very much reduced the mean age of its fleet. There are now only five single-screw vessels left in it. These are the *Arab*, built in 1879, by J. and G. Thomson, of Glasgow. She is now used as an extra steamer for cargo purposes only. Then there is the *Spartan*, a couple of years younger, built by the same yard, and now fitted with triple-expansion engines. This vessel is at present engaged in a round of transport work for the Government. And there are the *Mexican*, *Moor*, and *Trojan*, also, of which the oldest is under eighteen years of age, still employed in the mail service. All these three vessels have been tripled, and the *Moor* has also been lengthened and much improved quite recently. It would appear that the traveller will never again get an opportunity of travelling by a single-screw boat on the Union intermediate service, and his chance of doing so—if he be desirous of running the risk of an indefinite prolongation of the voyage by the breakdown of the engines—will only come once a month by the Union mail service. He will have to travel by some other line if he hopes to be kept for an extra month at sea at ship's expense.

The Employment of the Boats.

As to the *Tartar* and *Athenian* themselves, they seem to have fallen into good hands. For the Canadian Pacific Railroad, which has already provided itself with vessels of the highest class (such as, for instance, the three *Empresses* of 5,000 tons each, fitted with twin screws, and built to Admiralty requirements), has purchased them. Its intention, as shewn by an advertisement which they published in the Daily Press early in January, is to employ these two vessels on the coast between Vancouver and Klondike ports. The smartness with which operations are to be carried through is evidenced by the fact that by the time these Notes are in the hands of my readers the vessels will be already starting on their long run to Vancouver. They will, of course, go round the Horn, and passengers will be taken at very low fares for the outward "excursion." From Vancouver they have many alternative means of return. They can come overland by the Canadian Pacific Railroad and home across the Atlantic; or, in the second place, they can cross to Japan and Hong Kong by the *Empress* boats, and thence to India, Suez, and Marseilles by P. & O.; or, thirdly, they can travel by Mr. James Huddart's line to our Australian and New Zealand colonies, and thence come back by many alternative routes in British bottoms.

The White Star Line

advertises its new cargo boat, *Cymric*, as about to start on her maiden voyage on the 11th February. She is notable as not only surpassing Messrs. Ismay, Imrie & Co.'s own monster, the *Georgic*, in size, but as also exceeding either of the big Hamburg-American cargo vessels. She is, in fact, the biggest vessel afloat, except three mail steamers. But the building of a great cargo vessel is not a very notable event in the history of this firm. It is an event which recurs about once a year. But on the 1st of January a thing befell them which has not happened previously in their history. They found their shell too small for them, and they moved to new offices. Moreover, the new offices are not in Water Street, the long headquarters of the highest class of shipping firms in Liverpool, but in James Street. Some time ago I gave a preliminary account of the new premises. It is fine and large, indeed. Everything that wealth and experience and cultured taste can do, Mr. Ismay has done. The building is solidly constructed and handsomely designed by one of the best English architects we have, and it seemed, as I saw it months ago, in the rough, to reflect very great credit on those who were responsible for it. But its decoration—which I shall hope to describe in the March issue—is its great feature. This will not surprise those who have noticed the pictures—or even the binding of the books—aboard the great White Star passenger boats. Everything in the new office is well thought out and harmonises, as well with the taste of the owner, as with the purpose for which it is to serve, as the headquarters of the company whose reputation is so hign and so unique.

The bell of the old *Oceanic* is hung aloft on the outside gallery as a fire bell. This trophy has a curious history since the time that the name-ship of the line passed out of the company's hands. I believe, however, that it eventually came back to the old home by the courtesy of one of the most prominent of shipbroking firms.

One of the shipping papers goes into ecstasies over the postal arrangements and over the forethought which provided shoots from every floor in the offices to the main collecting box at the entrance. This is said by the paper in question to be an entirely new idea. I cannot quite admit this, for there is a building in London called Queen Anne's Mansions, where I saw the same plan in operation, certainly three years ago, and, as far as I know, it is in use to-day. But, if it is the first application of the device to business purposes, the credit is none the less to those who saw and appreciated a great labour-saving appliance and one which obviates many of the chances of letters going astray in course of post.

The Old "Britannic"

has completed her 250th round trip across the Western Ocean, and the owners have published some interesting statistics regarding what she has done. Still, with her original engines and boilers, it is remarkable that a voyage completed at her age in January should have far exceeded anything she did in the days when her every movement dislocated and reduced some record or other. Yet so it is. Her 250th westward run was made in seven days eight hours. When she came out the record to Queenstown stood at upwards of seven days and three-quarters. But she has improved her speed by travelling one and three-quarter million miles, a figure seven times as great as the distance between the earth and the moon. She has eaten more than half a million tons of coal, and carried something like a quarter of a million passengers.

Publications

from Messrs. Allan & Co. I have received particulars and maps of their arrangements in view of the expected rush to Klondike in the spring. There appear to be four routes to the goldfields at Dawson City. These are:—

No. 1.—The Long and Easy Route, *via* the Yukon River.

Vancouver, or Victoria, B.C., to Dutch Harbour, Aleutian Islands	2,000	miles
Dutch Harbour to St. Michael's, Alaska	750	,,
St. Michael's to Dawson City, Klondike	1,650	,,
	4,400	,,

No. 2.—The Chilcoot Pass Route.

Vancouver or Victoria, B.C., to Dyea	1,000	miles
Dyea Inlet to Lake Le Barge	125	,,
Lake Le Barge to Pelly River (Fort Selkirk)	278	,,
Pelly River to Dawson City, Klondike	173	,,
	1,576	,,

No. 3.—The White Pass Route.

Vancouver or Victoria, B.C., to Dyea	1,000	miles
Dyea Inlet up Skagway river to summit of White Pass	18	,,
Summit of White Pass to Lake Le Barge	94	,,
White Horse City to Dawson City (Klondike)	451	,,
	1,361	,,

Note.—The summit of White Pass is 2,500 ft. above seal evel and that of Dyea Pass is 3,500 ft. above sea level.

No 4.—The Stickeen River Route.

Vancouver or Victoria B.C., to Wrangell	750	miles
Wrangell to Telegraph Creek	150	,,
Telegraph Creek to Teslin Lake	150	,,
Teslin Lake to Dawson City (Klondike)	599	,,
	1,649	,,

One may add that neither the difficulty nor the expense of the journey is in any measure gauged by the mileage. In fact, one may say that the longest route seems the easiest.

The Allan Line affords every facility for getting to Vancouver, B.C., which is certainly the only point whence persons can make their departure for the goldfields, unless they get such an unusual chance as that afforded by the round-the-Horn trip of the *Tartar* and *Athenian*.

Having mentioned the four modes of getting from Vancouver to Klondike, it is now possible to give an intelligible explanation of the future employment of these old Union liners. They are to run between the port of Vancouver and Fort Wrangell. This is a 750-mile run, and these vessels will do it, at easy speed, well under three days, and will, during the pressure of traffic be able to make a round trip a week each. It is evident, therefore, that the route which is numbered "4" is the one which is most recommended by those who have studied the matter.

Twin-Screw Steamers.

I mentioned last month the case of *La Touraine*, which managed so easily to complete her voyage from New York after breaking one of her shafts, and losing her propeller in consequence. I have now full details of her experience. It appears that she left New York on the 4th December. The accident happened on the 8th, so that she was then in mid-Atlantic. After the accident her daily runs were, first day, 276 nautical miles; then 232, 231, 245 and 230 miles. This makes a total distance of 1,214 nautical miles steamed after the break-down, and it will be seen that in spite of the bad weather which characterised the month in question she maintained an average of fully 10 knots speed, and avoided all the necessity of taking any assistance until she fell in with one of the company's own tugs, which had been sent to assist her, off her port of destination, and allowed her and another tug to take charge of her through the intricate navigation at the entrance to the port. This taking

assistance in this way from tugs is a very small matter, and is largely a precautionary measure, yet in some directions it was exaggerated into something very serious indeed.

The New Steamships of the New York and Cuba Mail Line

attain a considerable importance in British eyes in consequence of the report of the recent West India Royal Commission and of the fact that improved communication between those islands and New York was so strongly recommended by the Commissioners. I referred a little while ago to the fact that the company had a somewhat ambitious building programme under consideration, and it is now authoritatively announced that they are about to have a couple of fine steamers built at the Cramp yard at Philadelphia. These vessels will be fitted for use as auxiliary cruisers in time of war, and will have a speed of sixteen knots Their great points seem to be their shallow draught—a maximum draught of 21 ft. loaded—and their twin screws. It is the fact of the latter requirement that has enabled Messrs. Cramp to secure the contract. For hitherto the fleet has been reinforced from the other important East Coast yard—that which was originally known by the name of its founder, Mr. John Roach. The vessels will certainly be valuable assistants to the United States Navy in case of war.

Ocean Excursions

are becoming more and more popular and more and more extended. I have already, in these Notes, referred to the excursion to Vancouver. I may mention another, only a little less extended, which has been extensively advertised by the Orient line. This was a trip to Colombo with a view to a return thence by the steamer due to leave that port on the 20th January, 1898. The special attraction is the fact that there was on the 22nd of the month a total eclipse of the sun, and it was promised that the mail steamer should be so navigated as to be on the line of central eclipse at the time of total obscuration. The opportunity is a unique one for scientific observers, but I have not heard to what extent the facility has been taken advantage of.

The Question of the Continuance of the Subsidies to Merchant Cruisers

seems to be very largely exercising the minds of certain persons who write on Naval subjects. The late Sir Henry Havelock-Allan made his last trip in the *Himalaya*, and naturally took her—as being one of the newer ships on the list—to be one of the cracks. He did not know the characteristics of P. & O. under the present *regime*. There is no comparison between the *Himalaya* and the Liverpool mercantile armed cruisers. Even the non-subsidised vessels of the Union Line to the Cape are much more likely to prove useful to the country than she is in time of war. There is no duplication of machinery, no protection of steering gear even in the latest P. & O. boats. Still, do not think their subsidy need be grudged them, for they are fine transports—as is seen from the good work done by the *Britannia* and *Victoria* in the trooping service, season after season. And, as transports, they would be worth the small subvention paid them, whilst, in consideration of their State aid, another ten vessels are held by the company at the disposal of the Admiralty, free of charge. But the casual military man was not to know all this, and, seeing the *Himalaya* as she is, he naturally made the observations I refer to. But the curious thing is that, although the forty-eight thousand a-year which is paid for the call of all the vessels on the list, is grudged in this country, foreign nations are all encouraging the building and adaption of vessels of this class to every extent in their power. What is forty-eight thousand a-year in our Naval Estimates? It would not provide the interest and depreciation on one such cruiser as the *Powerful* or *Terrible*, and for it we get the call of seven specially built twin-screw vessels, aggregating over fifty thousand tons, as well as that of the four single-screw P. & O. boats already referred to, which aggregate twenty-four thousand tons more. Then there are some ninety-five thousand tons of shipping, well suited for transport service, held at the call of the Admiralty without fee, but in consideration of that payment by the companies which own the subsidised ships. Altogether, then, the money commands about 175,000 tons of high-class modern steam tonnage. This, at 6s. 0d. a ton. It does not seem much in view of the prices willingly paid by the Government whenever there is even a war scare.

Besides, Germany is pressing us hard in the matter of fast passenger shipbuilding, whilst America is about level with us, and France has a large programme, to say nothing of that extensive organization, the Russian Volunteer Fleet. With a view to eventualities, the need of the moment seems to be the evolution of some plan to encourage the companies to lay down these expensive high-class ships.

Milford Docks.

The way in which those who direct the fortunes of Milford Haven hope against hope, and act as though they really believed that there was a good time coming, and that soon, is rather trying. One knows what a forlorn hope it is, but their insistence is so pathetic that one feels more inclined to sympathy than to ridicule.

Their latest move is to deposit a Bill in Parliament of which the chief *raison d'etre* seems to be the obtaining of permission to fund the arrears of interest on debenture stock. But a clause is added "in view of the contemplated establishment, *via* Milford, of a Transatlantic line of steamers," to empower the company to "make agreements for subsidising such steamship company." If they get the powers—or even the company—I wonder whence will come the funds to make the payments.

The Hamburg-American Company.

having determined to go in for the largest class of combined cattle and passenger boats, and having already built two such steamers, has begun to discard what are really twin-screw vessels of the most modern type, even if they be not of the greatest size now current. Already two of these new ships have been placed with first-class British lines, one hailing from Liverpool and the other from London. The steamers are having their names changed in accordance with the style of their new owners, and, as they were British built, the fact that they were originally owned in Germany may soon be lost sight of.

The French Line of the East.

At the present moment, when the P. & O. Company is returning to its old love and making Marseilles its passenger port, any details regarding the other lines which make their headquarters there, and are rivals in the same field of industry, must be of general interest. A little volume which I have just received from the Messageries Maritimes therefore proves unusually worthy of study. The Messageries have a world-famous name, though they are some twenty years junior to the P. & O. Company. They are a very great organisation. Their personnel is remarkably large, and gives a good idea of the extent of their operations. There are some twelve hundred persons engaged in the office work entailed by their business. The shipbuilding yards, which seem so essential an adjunct to a well-managed French fleet—as this most certainly is—give employment to close on five thousand persons, and afloat, in the service to which all the others are of course subsidiary, they have five thousand eight hundred more, so that altogether they have a personnel of nearly twelve thousand.

On the first of January, 1897, the fleet consisted of some sixty bottoms, with a gross tonnage of 219,002 tons, and a H.P. of 176,550 indicated. Four big steamers of a size and power equal to our own Eastern Mail boats were under construction, as well as a couple of smaller ships. What will be found especially interesting to readers of the MARINE ENGINEER, in connection with this fleet, is the fact that it was the first mercantile organisation to adopt the Belleville water-tube boiler, and it was after close observation of that boiler's performance in the vessels of this line that our Admiralty finally decided to fit such boilers into our great cruisers *Powerful* and *Terrible*. It is interesting further to note that the experience of the managers of the line is such that, after the experience they have had with these boilers in numerous ships and over a now extensive period, they still continue to fit them to their newest twin-screw vessels. It is impossible in the space at my disposal to give any very full description of the numerous services of the line. But it may be briefly stated that these divide themselves under three principal heads. Two of these make the port of Marseilles their headquarters, and one of them extends to the Levant, embracing Egypt, Palestine, Asia Minor, and Cyprus as well as the Black Sea, Turkish and Grecian ports. Another goes through the Red Sea to Aden. Thence it again branches off, and one limb runs to the South and touches at East African ports, besides going to Madagascar and Mauritius. The other limb stretches away to

India, the Persian Gulf and Colombo. Colombo, again, sees another division, for the vessels ply thence to China and Japan on the one hand, and to Australia and New Zealand on the other. The third head of service seems almost entirely distinct: for Bordeaux is its port, and it trades with the principal ports on the East coast of South America, and is thus brought into competition with an entirely different class of British trade.

From all one observes of the line, as well as from what one reads in its own literature, one is well aware that it is carried on with much consideration for the comfort and safety of its passengers, and that its cuisine and appointments are such as to make it many friends. We have already noted its up-to-date policy in regard to the boiler question, and one can very easily appreciate that the P. & O. Company is bold indeed in attacking such an organisation in its own stronghold.

The Lane Routes

which for so many years have been accepted by the great steamship lines across the Atlantic, and which are justly considered to have done much for the minimising of the risks of collision, are threatened. I do not myself believe that the threat is of great importance. It originates from France. It is reported that the French Transatlantic Company is to be forbidden by its Government to cross the Banks of Newfoundland between the 15th April and the 15th of October in each year, with its mail boats, under a penalty of 2,000 francs for each infraction of the law. The reason for this desire to make the Compagnie Generale Transatlantique avoid the Banks is obvious. France has many fishing boats engaged in cod catching. The French take a deep interest in these fishermen, as is witnessed by the fact that twice philanthropic Frenchmen have equipped and sent out hospital ships for their benefit. That these men run risks from the passage of the French liners is evidenced by the fact that but a few years ago a large French fishing vessel was sunk by collision with the crack mail boat, *La Touraine*, and that in consequence of this accident a sentence was passed upon the commodore of the line. The Beranger law, however, operated in his favour and prevented him suffering the penalty passed upon him. Now the French wish to make all liners avoid the Banks altogether between the dates named, which include the fishing season. It is reported that the British Government has consented to enter a conference for the international consideration of the subject. But, on the other hand, it is said that other parties, perhaps more interested than our Government, object altogether to the suggestion, and that the lanes themselves will be dropped if the conference be pressed. We shall see shortly how matters develop.

The Lady Shipmaster.

The Board of Trade seemed to be about to have a very difficult time before it, when Lady Ernestine Brundell Bruce—a peer's daughter, who has long distinguished herself in the yachting world—announced her intention of presenting herself for the examination for a certificate under the Board. The lady had taken the matter seriously enough, and had gone to those who make a business of preparing candidates for these examinations. The Board of Trade is equal to every emergency, and—having made up its mind that it does not want "lady-shipmasters"—avoided the mistake into which the University of Cambridge fell. That ancient seat of learning thought it had taken a middle path by allowing ladies to undergo examinations in papers similar to those set before male candidates, and telling them how they had done, whilst refusing them degrees. But experience taught it that the women candidates thought that, having passed the examinations, they had a moral claim to the degrees which the University refused to give. The Department was wiser, and took the initial point of refusing to allow the fair candidate even to be examined. She protested, and said she would take further steps. The Board—like ole Brer Rabbit—"kept on sayin' nuffin," and it scored. For the step the lady took was not one which tended to the annihilation of Whitehall Gardens, but to the merging of her interests with those of a fellow-student at the Liverpool nautical academy. In other words, she married a candidate who successfully took his master's certificate at the time admittance to the examination room was denied to her, and she will now go to sea, not as master, but a master's wife. This is all very well for the young couple, who will doubtless leave the Board altogether alone. But the Americans have "lady-officers," and the question is not finally set at rest on this side the water. We may even find that there are lady candidates for engineer's certificates. The question has to be faced. Laughing at it will not be enough. Is there any real reason why women should not be certified for sea service? It sounds absurd, of course, but we must ask ourselves if our objections are sound in themselves or merely old-fashioned prejudice, and possibly selfishness. One's own idea would be that, save as a stewardess, a woman's place is anywhere rather than in a ship's complement.

The Cunard Company

will suffer a severe loss by the retirement of Mr. Thomas Boumphrey. Few men have so complete a grasp of the very complex conditions which surround the work of the shipowner at this period of the century, and fewer still have the acquaintance which he has with the passenger business of the North Atlantic. It is greatly to be hoped that freedom from the anxieties of office may completely restore him to the health and vigour which so active a man should enjoy and knows how to appreciate.

Messrs. C. W. Kellock & Co.

send their usual list of steamers and sailers on the market. The number of vessels on their books seems to increase every month, although they are for ever completing sales which seem most satisfactory to either party to the bargain. In their present list they call attention to the fact that the day of the sailer is not so nearly over as is, in some quarters, imagined. They cite an instance—which does not seem to be altogether an exceptional one—of a sailer which was sold during the recent depression and, getting employment, returned her new owner the trifling dividend of 30 per cent. Foreigners seem to be very keen at picking up any good sailing vessels offering. But foreigners should not take all the pick of our markets, and it may well be that some attempt will be made to keep some few examples of the British sailing ship on the British Register. This would appear to be patriotism at 30 per cent.

The Pacific Steam Navigation Co

has lost its chairman. Mr. Robert Rankine, who succeeded Mr. Robinson at the head of the Board of this old-established Liverpool company, died on the 20th January. He was quite one of the old school of Liverpool commercial men, and was not only connected so intimately with this concern, but was also a director of the Midland Railway.

The Liverpool Underwriters' Association.

I have seen the annual report of this very importan and flourishing body. It has, during the past year, occupied itself with many questions which are of extended interest in the shipping and commercial world, affecting as they do the interests not only of underwriters, but of all connected with business. The lighting of our coasts, the storage of cargoes, the arrangements of the circuits, the regulations of the Board of Trade, the work of the Irish Lighthouse Board, all these and many other matters have been dealt with during the year, and are noted in the report which may be briefly summed up as a monument of the energy and tact of the able secretary of the institution.

A QUICK-ACTING STOP VALVE.

THE late disastrous explosion consequent upon the grounding of the *Lynx* and *Thrasher* has directed increased attention to means for obviating the dangers to the occupants of the boiler and engine rooms from sudden explosion of the steam pipe. It is only within the last ten years that this danger has been noticeable, and is no doubt due to the rapid increase of boiler pressure within those years.

Some of the most serious explosions within that period have been the *Elbe* in 1887, which resulted in the death of ten persons; the *Cephalonia* in 1889, in which two engineers and four stokers were killed; the *Jumna* in 1890, resulting in the loss of seven lives; the *Brandenberg* in 1894, with a loss of 43 lives; and the *S. Paul* in 1895, in which nine lives were sacrificed.

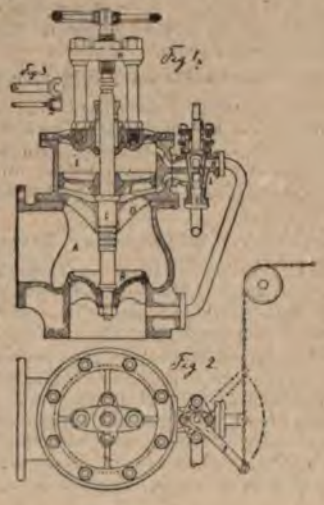
The British Admiralty have for some years been giving great attention to the stronger construction of

the main steam pipes, and in many men-of-war lap-welded steel pipes are now in use, and the bends and stop valves are made of cast steel.

However, the strongest construction of pipe, however strong it may be, is likely by that very strength to have increased rigidity, and, therefore, to be the more liable to fracture under collision or sudden shock.

It is well then to adopt such precaution as may be within our reach to immediately control and cut off the supply of steam from the boiler in case of explosion of the piping or engine cylinders.

We have pleasure in illustrating herewith the Fleron & Andersen quick-acting stop valve, as introduced into this country and made by Messrs. Bryan Donkin & Co., Limited, of Bermondsey, London, S.E. This valve has been adopted in the Danish Navy, and has been fitted to many steamers built at the shipbuilding yard of Messrs. Burmeister & Wain, Copenhagen, and the Elsinore Shipbuilding Yard. It therefore comes to this country with the practical recommendation of successful use elsewhere, and has already prevented a possible serious disaster upon a Danish torpedo boat.



The action of the valve is simplicity itself, as it does not pretend to be automatic, but is operated by band, chain, or lever from any number of suitable points, both in the engine-room, boiler-room, and captain's bridge.

The valve B is an ordinary stop valve in the usual casing A, but the valve cover is replaced by a short cylinder E, fitted with a piston F, which, sliding on the elongated spindle C of the valve, operates on a shoulder of the valve spindle, only to close down the valve against the steam pressure in case of explosion beyond the valve. The area of the piston F is greater than that of the valve B, so that with the same pressure admitted above the piston F to that which is below the valve, the valve is shut down. The valve spindle makes a fairly steam-tight water groove joint in the intermediate diaphragm between the valve case and the upper cylinder, and the valve spindle also runs through a packed gland in the upper cover of the cylinder. Above the spindle is a screw-down stop piece in the cross bar H, so that the valve can be screwed down by hand or regulated exactly as to opening in just the same way as an ordinary stop valve. The upper and lower parts of the cylinder E have ports J and K to the two-way plug M of the cock L, which acts as a steam-chest, and is supplied with steam from below the valve by the port N and a communication pipe.

When the plug M is turned so that both ports J and K are closed, the valve B is raised by the steam pressure below it, and can be used as an ordinary stop valve, and is also a non-return valve according to the requirements of the British Admiralty.

To close the valve in an emergency the plug is turned sharply by the handle P, so as to open the port J to steam and the port K to exhaust, and the valve B is thus at once closed by the steam pressure above F, operating on the surface of the piston which is larger than B.

This patented arrangement may, it is obvious, be adapted to any ordinary stop valve by adding the upper cylinder and connections and fitting a new spindle without interfering with the present positions of the stop valves or main pipes.

The plug M is easy and instantaneous in its operation, closing the large valve with lightning speed, and it is, of course, easy to arrange for operating the plug from any desired number of points.

The makers of this valve naturally consider it much more reliable than, and without certain disadvantages which they consider are peculiar to, automatic closing valves, which they state will close when the engine under manœuvres is suddenly brought to full speed; and those interested in the latter form of valve must look to the reputation of their valves as to action only under the emergencies of an explosion, and not at a time when extra supply is suddenly required.

SULPHUROUS ANHYDRIDE PROCESS OF REFRIGERATION.

WE have on previous occasions described processes of refrigeration in which the active agent has been either air, ether, ammonia, or carbonic acid, and we have given illustrations of the means by which the result has been brought about in each case.

We now have pleasure in presenting to our readers the details of the process of refrigeration by means of sulphurous anhydride as carried out by the Compagnie Industrielle des Procédés Raoul Pictet, of the Rue de Grammont, Paris.

It may be well to first point out the characteristics of sulphurous anhydride, SO_2, as it is a body that possesses special properties which distinguish it from all other volatile liquids. Its boiling point is 14° Fahr. under ordinary atmospheric pressure; in other words, if liquid sulphurous anhydride is poured into an open vessel the temperature of the liquid falls instantaneously and spontaneously to 14° Fahr. Therefore if the liquid is enclosed in a closed chamber the tension of the vapour given off therefrom rises as the temperature of the liquid rises. For example, at 50° Fahr. the pressure is 1 effective atmosphere, and at 86° Fahr. it is 3 effective atmospheres.

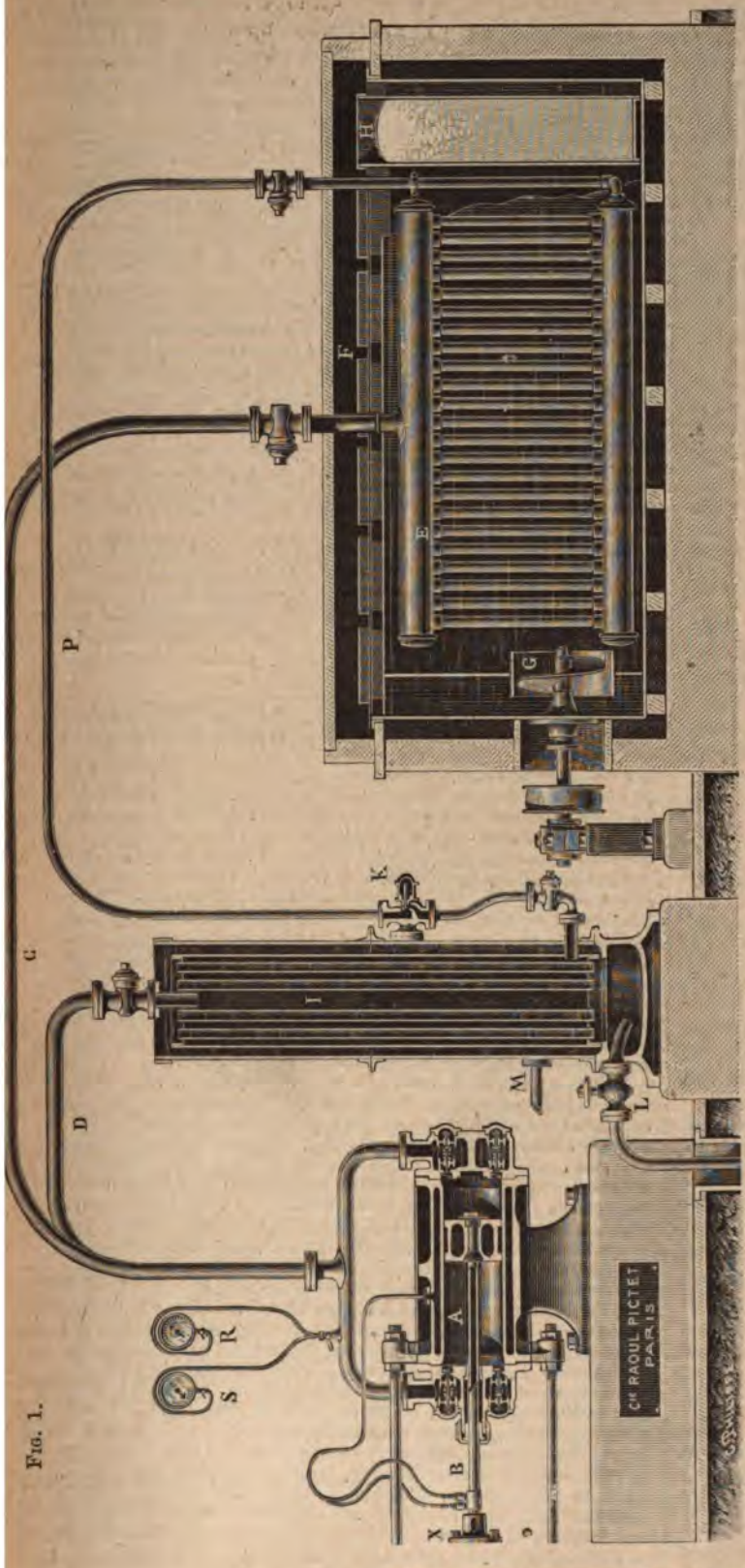


Fig. 1.

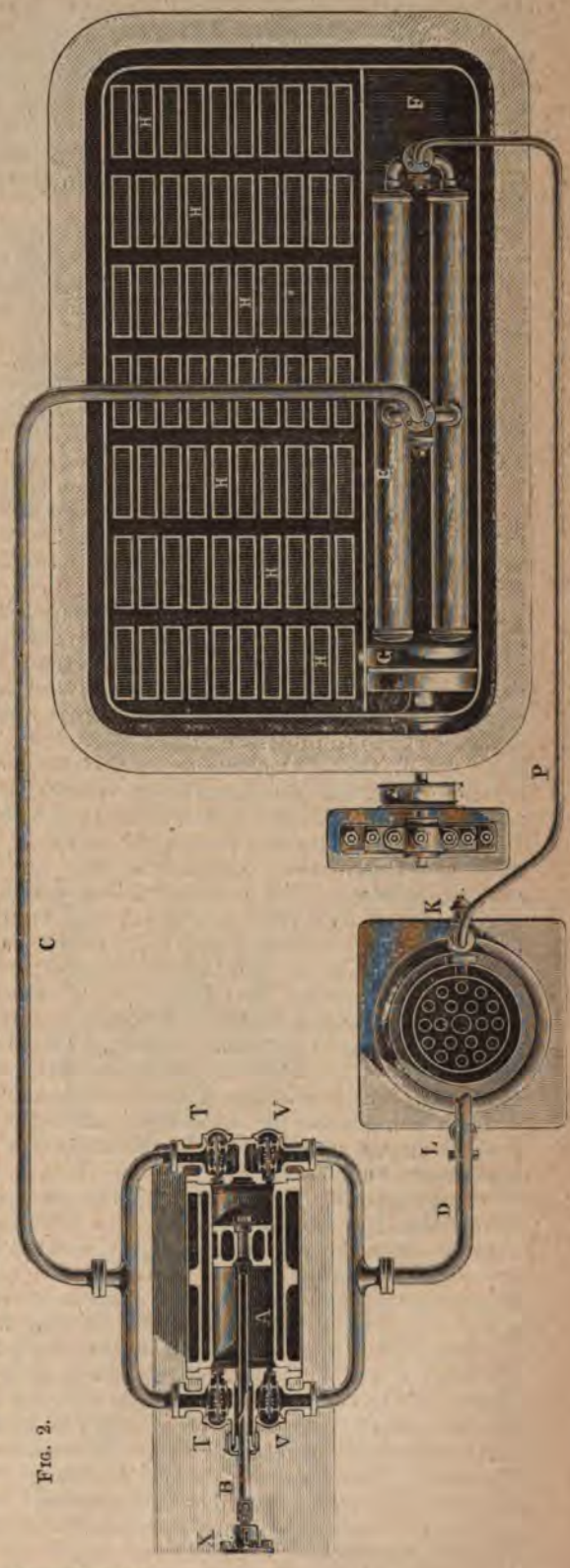


Fig. 2.

Sulphurous Anhydride Process of Refrigeration.

If now a pump be attached to the reservoir of sulphurous anhydride and produces a reduction of pressure, to say 5 lbs. per square inch absolute, the liquid in the reservoir will fall to −22° Fahr., or 54° below the freezing point of water. For every pound of SO_2 evaporated 100 units of heat are absorbed, which is abstracted from the liquid itself, and through the metal of the reservoir, from any liquid in which it may be immersed.

The pump then delivers its charge of SO_2 to a condenser, which is kept cool by a stream of water at ordinary temperature.

The necessary pressure of compression by the pump will depend upon the temperature of the cooling water. The higher the temperature the greater the pressure necessary to produce liquefaction of the gaseous SO_2.

The pressure in the condenser will always, therefore, be higher than that in the refrigerator, owing to the inequality of the temperature in the two chambers. This fact is made use of for keeping up the level of the SO_2 from the liquid accumulated in the condenser. To effect this a pipe is led from the lower part of the condenser to the refrigerator, having a regulating cock or valve in it, by which means the amount of liquid returned to the refrigerator is regulated so as to equal that evaporated therefrom.

We illustrate in the adjoining diagrams the apparatus for carrying out this process, in the form for use by ice machine, and we understand the manufacturers are now making machinery for working this process on board ships for cold storage purposes, which we hope to illustrate in the near future. Fig. 1 is a vertical, sectional elevation of the ice machine, and Fig. 2 is a sectional plan of the same. The compression pump A is driven by connecting the compression piston-rod B to any convenient source of power, such as a steam motor direct, or by belt and pulley gearing indirect. The pump A is connected to the refrigerator E by a suction pipe C, and to the condenser I by a delivery pipe D. In this case the refrigerator is placed with a brine tank F, which is arranged to contain ice-moulds H. A circulating screw G is arranged in the brine tank to produce a good circulation of the brine therein. The return of the liquid SO_2 from the condenser passes through the regulating cock K and pipe P to the refrigerator.

The cooling water for the condenser is led in by the cock L, passes up through the vertical tubes of the condenser, and down the annular jacket to the discharge pipe M. In the illustrations the compression piston-rod is shown fitted with a coupling X for attachment to the tail rod of an engine, and the suction and delivery valves T and V are shown arranged diagrammatically to facilitate the explanation thereof.

Coming now to the advantages claimed for this process, foremost amongst these is the elimination of all trouble arising from the introduction of oil or grease into the compressor, which by working through the condenser into the refrigerator, reduces the efficiency of all machines where lubrication is a necessity. Sulphurous anhydride being itself a lubricant, all other lubrication is unnecessary. Another important advantage is the low pressure necessary for the liquefaction of SO_2; these low pressures involve a very great reduction in the risk of leakage from the joints and packing boxes, and a considerable saving of power usually lost in tight glands and stuffing-boxes. A further advantage is that SO_2 in a pure state has no injurious action upon copper or its alloys, consequently this metal can be used for the construction of the refrigerator and for the tubes of the condenser. When ammonia is employed as a refrigerant its injurious action upon these metals necessitates the use of iron for all parts coming in contact with it, which, owing to the greater thickness required to bear the strain of the higher pressures necessary with ammonia, and to the inferior heat-conducting power of iron, results in a considerable sacrifice of efficiency.

Bearing on the point of the pressure of compression of the refrigerant depending on the temperature of the cooling water, it may be pointed out that with water at 95° Fahr., the approximate pressure per square inch above atmosphere necessary to produce liquefaction for the following substances is: Sulphurous anhydride 60 lbs., ammonia 180 lbs., and carbonic anhydride 1,190 lbs., which shows that SO_2 is three times as good as ammonia and about 20 times as good as carbonic acid.

The quantity of water required for condensing SO_2 is small, which is another important consideration.

The agents for this process in Great Britain and Ireland are Messrs. Sargent & Co., 25, Bucklersbury, London, E.C.

ELECTRIC POWER IN ENGINEERING WORKS ON THE MULTIPHASE SYSTEM.

IT has always seemed anomalous, to say the least, as has not infrequently been pointed out, that engineers and shipbuilders, who are engaged in a class of production in which every effort is made to effect economy and efficiency, should so often be found employing uneconomical methods in driving the works where these productions are created. Thus—to take only one example—the long ranges of steam pipes, often very imperfectly covered, connecting boilers and engines, in scattered and remote situations, simply constitute a sort of surface condenser in which the greater part of the steam is condensed before it can reach the engines it is intended to drive. From this and many similar considerations it has, however, become better and more widely recognised that some other method of power transmission than steam should be adopted, and electricity is fast being substituted for this purpose.

Five years ago there was little to show in this country in the way of electrically driven works on any systematic scale. An odd firm here and there had perhaps a dynamo on their works, with an electro-motor or two driving comparatively light tools; that was about all. The initiative in the more thorough adoption of electric power driving was taken up by firms in the North-East Coast of England more than by those of any other district, and it is there that the great bulk of the installations are which have since been carried out, although numerous installations have also been started in other parts of the country. The Britannia Iron and Steel Works of Messrs. Dorman, Long & Co., Middlesbrough, were amongst the first, if not quite the first, to adopt electricity for power purposes: to a limited extent at first, but rapidly extended and developed. Other iron and steel works, engineering works and shipyards in the district followed suit, the first shipyard to be exclusively driven by electricity being that of Messrs. Furness, Withy & Co., West Hartlepool.

On the Clyde, Messrs. Denny, of Dumbarton, and Messrs. J. and G. Thomson of Clydesbank—both of which firms, very early in the history of electric lighting, organised an electrical department in their works—introduced motors for driving various machine tools, and this practice is extending; while in Glasgow and the West of Scotland numerous engineering works are now, or about to be, wholly driven by electricity.

Most of the installations in question are, of course, on the con-

tinuous current system, hitherto almost exclusively in vogue, but several of the most recent and extensive installations are on the multiphase or polyphase system, which has many special advantages, and which, although scarcely as yet appreciated by users of electric power in this country, has obtained enormous development and high favour on the Continent and in America.

It is generally acknowledged by those who have experience of the working of electrical machinery of the continuous-current type that while accidents are rare in other parts, the armature with its commutators, brushes, and connections is the source of probably 90 per cent. of the difficulties to be met with. One of the outstanding features of distinction possessed by the generators and motors of the multiphase system is the absence of commutators and brushes, or any of the fine connections usual in motors of the ordinary continuous-current type. The advantages attaching to this feature in the multiphase system is of considerably greater importance, as found from actual working, than many would suppose who have as yet only a theoretical acquaintance with the matter. By the employment of multiphase plant the tension may be raised to any extent, and machines safely and economically run which are stationed at great distances apart. In cases where different branches of the same business are carried on at considerable distances apart, the high tension currents made use of can be transformed down for use in the motors driving machines. In the case of works of limited area the voltage is practically no higher than that obtaining in continuous-current machinery used for this purpose, and there is absolutely no danger to the workmen.

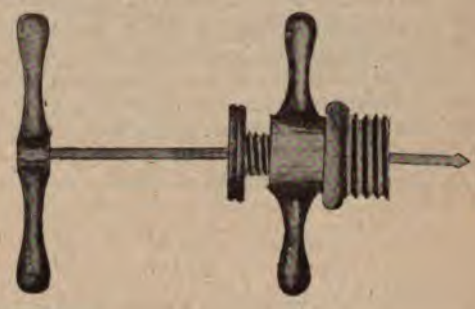
The important advantages of the multiphase over the continuous-current system are now beginning to be appreciated, and several large works on the North-East Coast are equipped or are being fitted with installations on the newer system. These advantages appear to have been very early recognised by Messrs. Walter Dixon & Co., electric power engineers, of St. Vincent Street, Glasgow, whose senior partner closely studied its working in various parts of the Continent. They were the pioneers in Britain of the system, and laid down the first installation of multiphase plant introduced into this country in a large engineering works in the Edinburgh district. The installation there has now been running for about two years, absolutely without a hitch, and giving the greatest satisfaction. The plant comprises two multiphase generators of considerable horse power, each having an electro-motive force of 200 volts running at 800 revolutions, one driven by a compound tandem steam engine, and one by a powerful gas engine, either or both of which generators supply current to about a dozen motors throughout the works. These range from 20 H.P. to 5 H.P., and actuate a variety of machine tools, both heavy and light, including plate-rolls, plate planing machines, boiler shell drilling machines, radial drills, punching and shearing machines, tube-hole cutters, cold saws, &c. In many cases the motors are fixed underground for convenience, an arrangement which secures a welcome absence of overhead shafting and belts, spaces being kept clear for overhead cranes, and obviating the necessity for heavy walls for supporting shafting, hangers, &c. The electric light plant for the works, consisting of arc and incandescent lamps, is also arranged to run in conjunction with the motors. The result generally, we understand, has been most economical working and grateful immunity from trouble or breakdown.

Messrs. Walter Dixon & Co. have other installations partially or wholly completed, or under way, both in Scotland and England, representing, we believe, an aggregate altogether of close on 2,000 H.P. They have also, we understand, introduced numerous multiphase motors into shipyards and engine works for the working of travelling cranes, jib cranes, punching and shearing machines, cold saws, centrifugal pumps, blast fans, and various other purposes. For all purposes where dust, dirt and adverse atmospheric conditions have to be contended with, the multiphase plant is found to be very specially adapted.

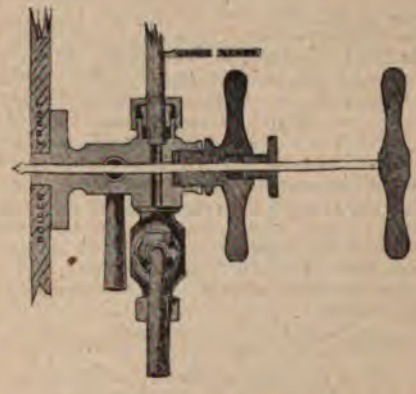
The subject of multiphase machinery has been dealt with in a practical way by Mr. Walter Dixon, in a paper read before the Institute of Mining and Mechanical Engineers, which probably is the only paper based on actual experience with this class of electrical plant which has yet been given in Britain. The firm, of which Mr. Dixon is the leading and energetic managing partner, have large experience in motor work of all classes, and on this account the lead they have taken in introducing the multiphase system is all the more the outcome of deliberate judgment as to the system most likely to receive extended development in the near future.

WATSON'S PATENT GAUGE-COCK CLEANER.

THE great, not to say vital, importance of due attention to the water-gauge fittings on steam boilers need not be more than simply remarked upon in a journal such as this. The consequences of inattention to gauge-cocks and glasses—apt as such things are to get clogged and otherwise inefficient—are sufficiently understood by all, and have been impressed by cruel



experience on not a few sea-going engineers. Anything which may lead to a false indication of boiler-water level in the gauge-glass, may, if neglected, lead without warning to burnt and collapsed furnaces, and all that that means in connection with "broken-down" boilers on board ship. Inattention and neglect in this matter often occur because of the danger of the attendant getting scalded by escaping steam in



cleaning gauge-cocks, especially in situations more or less awkward to get at, as is not infrequently the case on board ship. The usual method of cleaning is simply to unscrew the cap and insert a piece of wire through the body of the cock, a rough-and-ready enough proceeding, but one often leading to annoying, if not dangerous, results to the operator's hands when tried with the boiler under steam. Impressed with these facts through long experience with boilers in his capacity as surveyor to Boiler Insurance Societies, Mr. Henry Watson, now engineering manager to Messrs. Menzies & Co., Limited, engineers and ship-

builders of Leith, has patented the gauge-cock cleaner we herewith illustrate. This cleaner can be used with all confidence when any boiler is under steam. It is screwed to fit the gauge-cock, and when applied enables the attendant to clean the cock in a thorough manner, without any chance whatever of scalding, as the stuffing-box in which the drill works entirely precludes any such accident.

One of our views represents the cleaner by itself, and the other shows it in sectional elevation fixed to gauge-cock on boiler front. These simply and clearly exhibit the cleaner and its mode of application. We should think that the users of steam boilers, on shore as well as on shipboard, would find this gauge-cleaner an acceptable accession to the boiler-room equipment. Prices and further particulars may be had on application to the makers, Messrs. Menzies & Co., Limited, Leith, or to the patentee's representatives, Messrs. Walker Bros., 44, Constitution Street, Leith.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondents at home and abroad.)

The End of the Fight.

THE great engineering dispute is at last at an end, and work is now being resumed all over the country. The terms of settlement have of course been dictated by the masters, although several concessions have been made to them, perhaps more in form than in substance, the incorporation of the notes with each of the clauses of the federated employers' conditions enabling the men's representatives to announce peace in language that exhibits no bitterness. It has been an historic industrial battle, but it is hoped that by the commencement of the new financial year work at all the great shipbuilding and other centres of engineering activity will be in full swing. It will probably be a long time before we have a dispute of such magnitude as the one which has just ended, or one which has so affected the national interests. A great leeway in naval construction will now have to be made up, and it will probably be quite two years before we have recovered from the effects of this lamentable dispute. There was no good reason why the Admiralty should step in and put pressure on the masters with a view to ending the dispute earlier, and perhaps it is better that officialdom did not interfere but allowed the employers and employés to fight it out between them. There will now be no malice between master and men it is hoped, and capital and labour had better shake hands, after the fashion of Englishmen, and resume the friendly relations which existed prior to the cessation of work by the men in London.

Naval Engineers and Executive Rank.

The discussion on the subject of executive rank for naval engineers, which has been raging in American naval engineering circles, has found an echo over here, and a very interesting letter on the subject appeared recently in a contemporary. In it the writer considers that it would be difficult to find anyone in the Navy who holds the opinion that the position of the naval engineer on board ship is a satisfactory one, either as regards himself personally, or, which is of much greater consequence, as regards the efficiency of the service. This is rather far fetched, for after all a naval engineer is an engineer, and trains and enters the Navy with the object of looking after a ship's machinery, and not to fight a ship or command her. If he wished to do this, the way to it lies through the *Britannia*, and not by means of an engineering college. "Engineer" truly says, that the difference between the early training of the stokers and the seaman class is great, and makes the engineers task of maintaining discipline among the younger men a far more difficult one than that of the executive officer. But then it is the duty of the executive officer to assist him in maintaining order and discipline among the engine-room complement. The anomalous position of the naval engineer, says the writer of this letter, has been clearly recognised for many years by both engineers and executive officers. It is now more than twenty-two years since Admiral Cooper Keys' committee made its report on this subject as follows:—"The engineer branch of the Navy is at present classed with the civil branch of the Service as distinguished from the military or executive branch. This distinction appears to be no longer necessary. The chief engineer has a large body of men under his orders. We are therefore of opinion that engineer officers should in future be classed with the military branch of the profession." That is twenty years ago, and we are at one with "Engineer" that the reasons for a change have grown stronger since then, year by year. But we presume that the engineers of to-day do not wish to succeed to command, but that the engineer-lieutenant of the future shall hold practically the same position as a torpedo or gunnery lieutenant of to-day does. But naval engineers will have to qualify for such command, and as executive rank has not yet been granted it may be very many years before such a change comes about.

Increasing the Naval Personnel.

The statement that an addition of nearly 2,000 artificers and stokers has been sanctioned by the Admiralty can only cause the greatest satisfaction to all interested in the efficiency of the Navy. The exact numbers are 210 engine-room artificers and 1,700 stokers, the men to be equally distributed among the dockyards at Portsmouth, Devonport, and Chatham. If this number of men can be induced by the recruiting officers to join within the next month or so it will mean that this branch of the Navy has been strengthened during the current financial year by 430 engine-room artificers, and 3,300 stokers. This, of course, is not exactly an addition, for the fact must not be lost sight of that during the year a great many new ships have been commissioned, all requiring fairly large complements of artificers and stokers. Speaking at Bristol, the Chancellor of the Exchequer promised that in the coming Navy Estimates we should find increased provision for "our great present want," more seamen. All parties in the country ought to be, if they are not, awake to the necessity for a strong Navy, and when we say a strong Navy, we mean strong in officers and men of all ranks, as well as in ships, guns, armour, etc. It is worthy of mention, too, that the Admiralty have decided to enter on July 1st, 32 students at Keyham College. Twenty-four will be entered by open competition, five as nominated service candidates, and three as nominated Colonial candidates. Of those entered by open competition two are to undergo a special course of study in naval construction, with a view to their joining the Royal Corps of Naval Constructors.

Portsmouth Dockyard.

The chief news at this yard of the past month has been the commissioning of the *Cæsar* to take up her position as the new flagship on the Mediterranean station. The vessels of the Channel squadron, which have been in hand here for the making good of defects, are now out of hand, but some little grumbling was heard on board them when in dock, on account of a large percentage of these defects being struck out by the Admiralty on the ground that they could be repaired by those on board. Those in charge of the ships did not see the need of going into dock at all if they had to repair their own defects, but it must be admitted that the more independent each ship becomes of outside assistance, the more it makes for the efficiency of the Navy in general. No alteration of the date, March 31st, when the *Hannibal* will be out of hand, has been made, although, had the rumours flying about of preparations for a serious turn of events in the far East been true, she could no doubt have been completed by now. Good progress is being made with the new boiler-shop in the extension, and it is calculated that in about a twelvemonth's time the yard will be almost independent of outside contractors. Six new boilers, intended for the *Dreadnought*, have just been sent from here, all being made in the yard. The keel plate of the *Pandora* has been laid, representing the official commencement of the building of the vessel, although actually she was commenced a week or so beforehand. The trial of the new boilers which have been put into the *Dasher* showed at first that she could develop the H.P., 3,800, required of her; but she came very near to it, and

at one of the trials exceeded it for a short time. A number of the boilers for the cruiser, *Gladiator*, have been delivered by the contractors. The new battleship *Formidable* will shortly be commenced now. She will displace 15,000 tons, have a length of 400 ft., and a beam of 75 ft.

New Torpedo Boat Destroyers.

Further additions to our already large fleet of destroyers have been decided upon by the Admiralty, for orders have just been given out for the construction of five new torpedo boat destroyers, whose dimensions will be much larger and the speed greater than any yet launched or completing. The names of the five vessels are the *Lee*, *Leven*, *Orwell*, *Spiteful*, and *Stag*. The first-named will be built by Messrs. Doxford & Sons, of Sunderland; the *Leven* by the Fairfield Shipbuilding Co., of Glasgow; the *Orwell* by the well-known firm of Laird Brothers, of Birkenhead; the *Spiteful* by Palmers' Shipbuilding Co., of Jarrow-on-Tyne; and the *Stag* by Messrs. Thornycroft, of Chiswick. This is good news in view of the energy which is being displayed by other great Powers in the construction of destroyers. The First Lord, in the memorandum for 1897-98, referred to only two, so apparently the decision to build the additional three was made subsequent to this.

An Italian Navy League.

The great success which the Navy League in this country has met with has been the means apparently of almost every other naval Power opening a similar sort of institution, and the lastest is the Italian Navy League, which is avowedly run on lines similar to our own. Engineer Porenzo d'Adda is the director of the society, but the foundation of it is due to Signor Vecchij, the well-known Italian naval writer. The first number of a paper run in the interests of the League has just been issued, *La Lega Navale*, and in it is announced the programme of the League. Engineer d'Adda endeavours to impress upon his countrymen that the sea frontiers of Italy are much larger than the land frontiers, yet nevertheless the money spent on the Army is considerably greater than that spent on the Navy, which now only takes a sixth place among the other European Powers. He also considers the Triple Alliance of little use as far as Italy's sea defences are concerned, in the event of war. Italy must not depend upon England for help, either, for before assistance could come from us the Italian fleet would be destroyed by that of France, argues *La Lega Navale*. The Minister of Marine and many members of the Royal Family have given their support to the new institution.

Progress in Cruiser Construction.

It is now definitely decided that during the current financial year four new cruisers of the *Cressy* type will be laid down, and that this number will later on be extended to twelve. The new cruisers are to have a six-inch armour on the water line and armour protection for their heavy guns. They will have a displacement of 10,500 tons and a speed of 21 knots. It is stated by many that this *Cressy* class will be superior to the *Argonaut*, which has been considered superior to the latest type of French cruiser, the *Montcalm*. If this is so it follows that we are able to build the finest cruisers laid down. The French Admiralty contemplate laying down six cruisers of the *Montcalm* type this year, and she has three armoured cruisers of 7,500 tons now in hand. Large protected cruisers do not find now as much favour as they used to, and consequently they are not being built in such numbers as formerly, although we have eight 11,000-ton protected cruisers completing or on the stocks. A change, however, is about to take place, for we are to lay down a number of the finest armed cruisers that money can buy.

Devonport Dockyard.

A heavy programme of work will have to be coped with by the engineering branch at Keyham, and the usual prophecy of a discharge of hands which crops up about this time will not be credited, so bright is the outlook as regards continuous employment for all. Work on the *Psyche* progresses rapidly, and considering that she has only been on the slip about two months, it must be admitted that she is building very fast. Her castings are being turned out of hand at Keyham, so that delay in this direction will be avoided. The order which was received here cancelling the extensive programme of steam trials which the *Arrogant* was to undergo, and directing the vessel to be immediately prepared for the pennant was the cause of many surmises as to her destination, but the general belief was that she was to proceed to Hong Kong, there to strengthen the China Squadron. The *Cambrian* has paid off from her commission in the Mediterranean, and the *Flora* has been commissioned to relieve the *Retribution* as senior officer's ship on the south-east coast of America. The *Devastation* has been paid off, being transferred to the A division of the Fleet Reserve, and her crew turned over to the *Nile*, which will now act as flagship in the Hamoaze. During the past month the Admiralty requested that a survey should be made of the cruiser *Shannon*, to discover the cost of bringing her forward for service in the Reserve Squadron. It was estimated that £30,000 would be required for the purpose, which was too high for their lordships, so she is to be dismantled and placed in the D division of the Dockyard Reserve.

To Raise the "Victoria."

A most interesting scheme has just been put forward, which has for its object the raising of the ill-fated *Victoria*, which, it will be remembered by everyone, was lost in the Mediterranean some years ago. The wreck now lies in some 450 ft. of water off the coast of Tripoli, much too deep to admit of the employment of divers, and its weight in water is reckoned to be about 7,000 tons. The scheme in question is to raise the vessel by means chiefly of powerful electro magnets. Hydraulic rams and dynamo machines are also to assist in the operation, to be fixed up on pontoons just above the wreck. The magnet to be used would be lowered over the side, and when near enough to the sunken vesel would be drawn towards it, and on touching any iron or steel parts would hold on with a power of 100 tons. Several magnets would be used, and as each one attached itself it would be indicated by means of an electric dial on the pontoon above. A trial pull would be given to see that the magnet had taken a firm hold, and if such were not the case it would be fixed to the ship in another place, and when the whole of the magnets used had taken a firm hold, the wreck would be ready for raising. The hydraulic cylinders on the pontoon would be in connection with each other, and a balancing accumulator would prevent any of the ropes attached to the magnets getting more than its due strain, 100 tons. When the sunken vessel was sufficiently near the surface it would be towed to shallower water and beached. All this is certainly very interesting, but it is doubtful if it would be worth close upon £100,000 to recover the *Victoria* after the long time she has been under water, and then to pay about as much again for repairs. But the whole scheme is more theoretical than practical.

Destroyers for the U.S. Navy.

The decision of the Government of the United States to go in for torpedo-boat destroyers in place of torpedo-boats is undoubtedly a wise step, and it is to be hoped that she will have more luck with the destroyers than she has had with her other warships, which, if we are to believe the pessimistic reports which reach us, are all more or less defective. The Navy Department have ordered three as a commencement, each of them to cost about £50,000 each. One of them has already been contracted for and the design is in the hands of the contractors, who are to practically have a free hand, except as regards speed, armament, &c. She will have a length of 205 ft., and a beam of 19 ft., and a displacement of 265 tons. Her contract speed is to be 30 knots, but of course the builders reckon on getting more than this out of her. Her armament, which is rather heavy, will consist of four 6-pounder quick-firers, and three 18-in. Whitehead torpedo discharging tubes. Her engines are to give 6,000 H.P. at 400 revolutions a minute, and she will be fitted with water-tube boilers. We are informed that the firm which has secured this contract is also building a couple of torpedo-boats for Russia, whose speed has been guaranteed at 38 knots.

A Welcome Volume.

The modernized edition of Mr. R. Sennett's "Marine Steam Engine" is a volume which should claim the attention of all interested in engineering, naval and otherwise. It will be remembered that this book was first published in 1882, and that since then the science of marine engineering has undergone an almost complete revolution. Mr. H. J. Oram, the senior Engineer Inspector at the Admiralty, has undertaken the task of bringing the "Marine Steam Engine" up to date, out of admiration chiefly for the labours of his predecessor, and the result is that the book is practically a new work. The book, when originally published, held a foremost place among standard works on marine engineering, and the revised edition in question

should do the same. Sir A. J. Durston has written a short introduction to the work, in which he says: "To the many who knew the late Richard Sennett, my old friend and predecessor in office, and appreciated his work and worth, and regretted the all too early closing of his early career, it will be a source of gratification that the revision of this book has been undertaken by so capable a marine engineer as inspector of machinery, H. J. Oram, R.N. Mr. Oram has acquired a vast amount of special knowledge and experience of machinery of the latest types, and it is believed this has been incorporated in the present edition in a manner which will make it of great value to students, young engineers, and officers of the Royal and Mercantile Navies in carrying on their studies and duties." The work devotes a section each to the history and progress of marine engineering, boilers, steam, mechanism, and propellers.

Chatham Dockyard.

Unusual activity prevails here, and a couple of weeks ago in the docks and basins here there were eight battleships, 23 cruisers, four torpedo gunboats, seven destroyers, and the same number of torpedo boats, a fleet which many a country would be proud of. Good progress is being made with the battleship *Goliath*, and it is most likely that her launch will take place towards the end of the current month. The steel castings for the stern and rudder-post have been placed in position, and the launching ways under her are now almost ready. Most of the gear used in the launch of the *Victorious* is being brought into requisition. As soon as she is off the slip the construction of the *Irresistible* will be commenced. The *Pioneer*, too, which lies in No. 2 dock, and the first keel of which was laid about six weeks ago, makes wonderful progress. The *Vindictive* has at last got the whole of her 18 water-tube boilers in. Some little disappointment was caused by the *Vindictive* failing to pass the required test at induced draught, but the important alterations made by the contractors in the fan machinery will, it is expected, set things right in this respect. Before the departure of those ships of the Channel Squadron here for refit and the repair of defects, the whole of them were fitted with range-finders. The plans and specifications of the new battleship *Irresistible* have arrived here, and from them it seems that she will be somewhat of an improvement on the *Goliath*. Her engines will be of 13,500 H.P., with Belleville boilers of sufficient power to give her a mean speed of 18 knots. Her armament, coal supply, and bunker capacity will be practically identical with those of the *Goliath*.

Sheerness Dockyard.

This yard has been exceedingly busy during the past month, chiefly in connection with the preparation of the ships of the Channel Squadron for the pennant on February 1st. Overtime had to be resorted to in many cases, notably on the *Speedy* and *Racoon*, both vessels having a pretty extensive list of defects. Indeed all concerned had to hustle themselves to complete her refit in time for her to assemble with the remaining ships of the Squadron. The *Racoon* was in a worse state if anything, her condition necessitating a thorough overhaul and repair. It is worthy of mention that this cruiser has been supplied with 6-in. quick-firers, in place of her 6-in. breechloaders. Work on the two new sloops *Condor* and *Rosario* continues at a brisk rate, and the only difference in them from the *Torch* and *Alert* will be that they will have water-tube boilers. They will displace 890 tons, and have a length of 180 ft. The engines for one of them will be built by contract, while those for the other will be erected in the steam factory at Keyham. The torpedo-boat destroyers attached to the Sheerness flotilla have caused a good deal of work that they might resume their duties on the expiration of Christmas leave. It was found necessary for the *Haughty* to have one of her boilers retubed, and as regards the *Snapper* overtime had to be resorted to. The *Pomone*, which was the only ship launched from here during the past year, has still much to be done to her before she is ready for commissioning

Pembroke Dockyard.

The progress of the Royal yacht is one that apparently interests the officials here more than anything else, for men are constantly being drafted from the *Andromeda*, or elsewhere, to work on the vessel. Great efforts are to be made to hasten the new yacht's building. A slight delay or rather set-back occurred recently, as Sir William White disapproved of the shape of some of the body frames when in place. A special effort is being made to hurry on the *Spartiate*, and overtime is being resorted to for this purpose. The thick protection deck is in a state of completion, and work on the forecastle deck and in the interior is also very forward. The manner in which the *Andromeda* is forging ahead is also very satisfactory, although the hands at work upon her are occasionally drawn upon for the Royal yacht. Her propelling engines are practically finished and, indeed, have been so for some time, and her water-tube boilers in three of the four stokeholds are now in position. Much dissatisfaction has been expressed here at the action of the Portsmouth authorities as regards the reduction of the thickness of the vessel's decks. This will necessarily involve the expenditure of much money in new fittings, thus increasing her cost very considerably.

A New Device for Plugging Shot-holes.

Some important experiments have just been made at Portsmouth with an American form of celluloid, made from the pith of cornstalks, with the object of discovering its value in stopping leaks or shot-holes. It was claimed for the celluloid that it plugged a hole automatically, expanding only in those parts which come into immediate contact with water. It is the invention of Messrs. Marsden, and is said to have been used on board American men-of-war, so that additional interest in this respect attached to the trial. A coffer-dam 3 ft. thick was erected, with steel plates in front and rear of it, to represent the side of the vessel. A shell was then fired into this and the water test applied, with the result that the celluloid did not bear out all that was claimed for it, for the water came pouring out of the broken plate at the back. Certainly the shell burst inside, and had it gone right through the effect might have been different, but as far as shell-fire was concerned the experiments were not a great success.

The Launch of the "Argonaut."

A few days ago there was launched from the yard of the Fairfield Shipbuilding Co. at Govan, the first-class cruiser *Argonaut*. She is the first of the new series of *Diadems*, and will closely resemble this vessel in appearance. The principal dimensions of the newly-launched cruiser are:—Length over all, 462 ft. 6 in.; length between perpendiculars, 435 ft.; extreme breadth, 69 ft.; displacement, 11,000 tons. At normal draught her coal capacity is 1,000 tons, but if necessary she can carry about twice that number of tons. She will have a complement of 700 officers and men, and will be rigged with two masts and four funnels. Her engines will develop 18,000 H.P., with a speed of 20¾ knots, natural draught. Her armament will consist of two 6-in. guns in casemates, four 6-in. in shields, four 12-pounders, three 3-pounders, eight Maxim machine guns, and two 18-in. submerged torpedo tubes. Her hull is built of Siemen's-Martin steel. The Countess of Hopetoun performed the christening ceremony, and at the luncheon in honour of the launch Sir William White was present. He stated that the *Argonaut* was built to perform specific duties. She was somewhat smaller than the *Powerful* and *Terrible*, but this did not indicate that the Admiralty was going back upon the principle which led to the construction of these two fine ships. The *Powerful* and *Terrible* were built because vessels in existence in the navies of other Powers required to be met. A sound principle, which he hoped the Admiralty would not depart from. The class in question were being built to protect our commerce and communications in the most distant parts of the world. After the launch a shed, on which a number of people stood, collapsed, and one man had his leg broken. It will be remembered that some months ago a fire broke out at the Fairfield yard, which has considerably delayed the launch of the *Argonaut*, an event intended for last July. If this had not happened the *Argonaut* would have established a record for rapid construction.

Cruiser Trials.

Several important trials of new cruisers have taken place, but chief among these must be mentioned those of the *Diadem*. These trials were exceedingly interesting, owing to the fact that she is the first of eight similar cruisers now under construction. She is fitted with a new arrangement of the Belleville boilers, of which she has 30, to give her an I.H.P. of 16,500. Altogether it is expected that this class of vessel will prove infinitely more useful for general purposes than much larger ships, and although their bunkers only carry about half as much coal, this disadvantage, if it is a disadvantage, is compensated for by the fact that their reduced draught will allow them to pass through

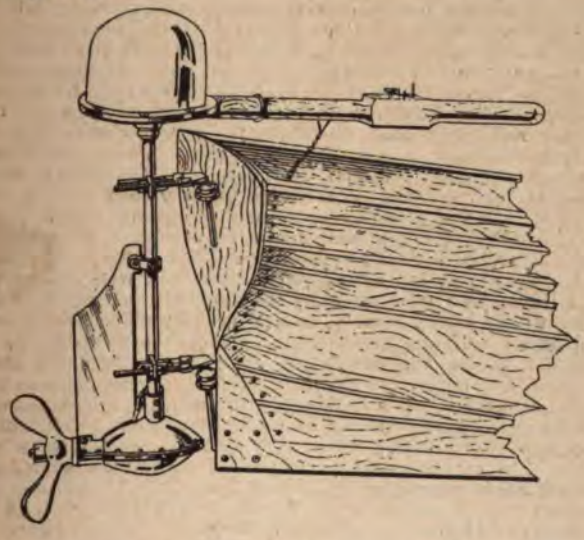
the Canal, and to steam into many harbours which the deep draught of the *Powerful* and *Terrible* do not admit of. In the first of the series of trials which the *Diadem* will undergo several runs were made with 3 315 I.H.P., giving her a speed of nearly 13 knots. The trials are not intended so much to indicate speed as to provide useful information for the constructors to make calculations for the rest of the vessels of this class. Both the 30 hours' trial at four-fifths of her power, and her eight hours' full-power trial were considered highly satisfactory.

Launches and Trials of Torpedo-Boat Destroyers.

Several important trials of torpedo-boat destroyers have taken place during the month. A new torpedo-boat destroyer has also been launched from the yard of Messrs. John I. Thornycroft & Co., the *Cygnet*. The *Seal*, built by Messrs. Laird Bros., underwent a full-power trial with the following satisfactory results: speed on mile, 30·04 knots; speed on three hours' run, 30·02 knots. The *Wolf*, built by the same firm, has had a satisfactory full-power coal-consumption trial. On six runs over the measured mile the mean speed obtained was 30·3 knots with 370 revolutions, and the speed for three hours' run 30·11 knots. The *Dasher* has received her new boilers, and had a trial of her machinery recently, but failed by a little to develop the required H.P. The *Lynx*, which it will be remembered, came into collision with the *Thrasher* some time ago off the south coast of Cornwall, has now had her injuries repaired, and is ready to be commissioned for the torpedo instructional flotilla. The *Thrasher*, it is expected, will not be ready for sea for another three months, as, owing to the engineering trade dispute, great delay has been experienced in the delivery of her special machinery.

PORTABLE ELECTRIC PROPELLER.

THE neatest thing we have seen lately is the device we illustrate herewith, McLachlan's patent portable electric propeller for boats, for which the inventor, Mr. E. A. McLachlan, of 55, Brighton Road, Stoke Newington, London, N., is obtaining large orders.



The peculiarity of this little motor is its immediate applicability, without alteration to the hull, to any boat, skiff, gig, or launch which it is capable of driving. The whole motor or propeller is mounted with the rudder on a special rudder post engaging with the usual pintles to the stern of the boat, the whole thing turning on the pintles under a tiller handle, as in the case of the ordinary rudder. This arrangement gives the double advantage of easy adaptation and removal, and at the same time gives greatly increased steering control, the propeller turning with the rudder, giving power to turn the boat almost on its centre.

The whole weight of the motor propeller and rudder as shown is only 35lbs., and although so light is capable of developing up to 1 H.P. The switch for starting, stopping, and reversing the propeller, is fixed on the tiller handle, and thus most conveniently to the steerer, and the terminals are also on the root of the tiller, for attachment of elastic main leads from accumulator batteries.

The motor in this size is wound for a potential of 40 volts, and a current of 12 ampères, the propeller rotating at 600 revolutions.

The force so developed has been proved, at the late Cowes Regatta, capable of driving a 16 ft. heavy sea gig of 5 ft. 6 in. beam, about 3 ft. depth at stern, with six passengers aboard, at six miles at hour. The inventor is prepared to quote for apparatus up to 5 H.P.

The accumulators for the small size motor consist of from 15 to 20 cells, according to size and class of boat, and they are contained in three or four neat polished teak-wood boxes fitted with lids and leather straps for lifting the boxes in and out of the boat for charging or removal. The size of each of these boxes is 15½ in. by 7¼ in. by 7½ in., and the total weight of three boxes with 15 cells is 150 lbs., and of four boxes 200 lbs. only.

There is sufficient power stored in these accumulators for a run at full speed for five hours, that is, about a run of 30 miles, but by increasing the number of boxes a longer run can be obtained.

On the Thames, where charging stations are so frequent, this portable electric propeller seems to be exactly what is wanted, as many a man already has his boat on the river, and at a known inclusive cost he can at once adapt electrical propulsion without any annoyance from smoke or any danger from steam, and with no trouble as to attention or stoking. A 30 miles run would probably cover his day's run with lots to spare.

In the case of dinghys or gigs attached to gentlemen's steam yachts or other steamers with their own electric generators on board these motor accumulators can be readily charged at any time, and when not wanted can be discarded, leaving the boat a perfect row boat as before.

The portability of the apparatus is such also that it can be carried as luggage in a cab or train to any river or seaside resort, and there fitted to an ordinary rowing boat and brought back again when the run is over.

There are no complicated parts to get out of order, and instructions for the use of novices are sent with each complete set.

Institution of Naval Architects.—The annual meetings of this Institution will take place on Wednesday, Thursday, and Friday, March 30th, 31st, and April 1st, in the Hall of the Society of Arts, John Street, Adelphi, W.C.

Chatham.—We understand that Messrs. Geipel & Lange, of 68, Victoria Street, Westminster, London, S.W., have been appointed consulting engineers to the Chatham, Rochester and District Electric Lighting Co.

REFRIGERATING MACHINES.

THE refrigerating installations supplied by J. & E. Hall, Limited, and ordered from them during the past year, 1897, do not show much diminution, notwithstanding the fact that they were hampered for some time by the strike. Nearly 1,000 machines have now been supplied by them, all of which have been manufactured in England, at their works at Dartford. Over 450 have been fitted on board ship. Her Majesty's Admiralty have placed more orders with this firm for fitting battleships and cruisers, the latest being for H.M.S. *Ocean*, *Canopus*, *Glory*, *Andromeda*, *Centurion*. The installation of H.M.S. *Sanspareil*, which was recently completed, gave most satisfactory results at the trial. This installation is on their patent carbonic anhydride system, and includes the cooling of the magazines. The Japanese Admiralty have placed orders for fitting two more battleships, *Takasago* and *Shikisima*, in consequence of the installation fitted by them on the *Fuji* having been so eminently successful. The three installations on order for the Dutch Admiralty, for their new cruisers, have been completed. In these installations full advantage has been taken of Hall's system to distribute the cold in various parts of the ship. The White Star Co. continue to give preference to Hall's patent carbonic anhydride system, having not only had their latest leviathan, the s.s. *Cymric*, fitted, but also having recently decided to replace the air compression machines fitted some time since in their s.s. *Tauric* and *Nomadic*, with the more recent and economical system of refrigeration. This will make 14 of their ships fitted with Hall's system.

The Hamburg-American Steamship Co.'s s.s. *Pennsylvania* and *Pretoria* have also been similarly supplied by the same firm, who have installations in hand as well for the *Brasilian*, and for two more ships now building for the same company, which will make in all 20 of their ships that Hall's have supplied with refrigerating machines. The Chargeurs Reunis Co., of Havre, who have now taken up extensively the importation of frozen meat, have fitted two more ships with Hall's machines, making 14 in all. For the importation of fruit, and also for preserving the passengers' provisions, the Union Steamship Co.'s new ship, s.s. *Briton*, has been fitted with Hall's machinery, making the 24th installation for that company. Messrs. Donald Currie & Co. have also had two more ships fitted, the latest being the *Carisbrooke Castle*, and another building, making ten installations in all. The Royal Mail Steam Packet Co. another installation for their s.s. *Severn*, making 20 in all for their ships fitted with Hall's machines, the new system being adopted in all recent cases. Messrs. Bullard, King & Co. have also placed a third order with Hall's for their s s. *Umgeni*. For the importation of butter and bacon a considerable development has taken place. The United Steamship Co. of Copenhagen, having placed orders with J & E. Hall, Limited, for fitting six more of their steamers. Messrs. Donaldson Bros. for their s.s. *Kastalia*, and Messrs. Allan for their s.s. *Sardinian*. Other orders include the Russian Volunteer Fleet, Baron Rothschild's new yacht, the Nippon Yusen Kaisha of Japan, machines for three steamers of the Oriental Steamship Co., of Japan; J. T. Rennie & Co., for their s.s. *Ingeli*; J. Moss & Co., African Steamship Co., a fourth installation; Compagnie Belge Maritime du Congo, two more ships, making the third and fourth installations; and the Netherlands American Co.; besides a large number of machines supplied for use on land.

DEFECTS IN PROPELLER SHAFTS.

A MEETING of the Institute of Marine Engineers was held on January 10th, at the Institute premises, 58, Romford Road, Stratford, when a paper by Mr. M. W. Aisbitt, "On Certain Defects Found in Propeller Shafts," was read.

The Chairman, after expressing regret that Mr. Aisbitt was unable to be present to read his paper, said it dealt with a subject in which all marine engineers were undoubtedly very much interested. In fact, the fracture of a propeller shaft was often a question of life and death to those on board, and it was therefore of the greatest importance that they should obtain every possible information as to the causes of the defects in these shafts and the best remedies.

The paper was then read by Mr. James Adamson, the honorary secretary, who said it was originally intended that the subject should have been illustrated by a number of lantern views. Unfortunately the views had not arrived in time, but he hoped they might be shown when the paper was again discussed a fortnight hence. As having an important connection with this question of defects in propeller shafts, Mr. Adamson called attention to the presentation of a gold watch and chain and a cheque for 150 guineas, recently made by underwriters to Mr. Charles M'Eachran, a member of the Institute, and the chief engineer of the steamship *Tokomaru*, in recognition of the splendid services rendered by that gentleman in repairing a broken tail shaft in the course of a voyage from New Zealand to London. Mr. Adamson said he thought it important that a record of this character, in which the members generally took some pride, should be included in the "Transactions" of the Institute. In reading the addresses that were delivered on the occasion of this presentation to Mr. M'Eachran, he had been reminded of a remark by Earl Stair on the relations between employer and employed. The Earl said: "No separate interests can subsist between employer and employed. If you thrive, I thrive. On your well-doing will depend my comfort, my honour, and my character, for I shall stand high or the reverse, as I act justly or unjustly by you." Mr. Adamson thought this sentence particularly *apropos* of much that was said in connection with this presentation to Mr. M'Eachran.

Mr. M'Farlane Gray suggested that a board or tablet should be placed in the hall of the Institute bearing some brief but permanent record of a specially meritorious service of this character by one of the members, and after some conversation it was agreed, on the proposal of Mr. Hawthorn, that the suggestion should be referred to the council to do therein as they thought best.

Mr. Aisbitt, in the course of his paper, read by Mr. James Adamson, said he was sure they were all agreed as to the importance of this subject, especially when they remembered that the failure of propeller shafts was often the cause of many precious lives, together with much valuable property, being lost and, in addition, the anxiety entailed upon them to decide as to whether or not a given shaft was safe was of considerable moment to them all. Before fully entering into the matter, he would lay before them a list of defective shafts which had come under his immediate notice for the years 1895-6-7, the average life of which appeared to be about four to five years, but it must be remembered that he had taken the life of the vessel, and that therefore the actual average would be considerably lower. In the year 1895 there were 40 shafts condemned under his notice, 60 in the year 1896, 70 in the year 1897. Before proceeding further he would enumerate the various defects found in propeller shafts, viz.:—Those which were actually fractured in a diagonal line, say, between the inner and outer liner, caused by the propeller striking some semi-submerged substance, &c., those which were also caused by the propeller striking some submerged substance and creating a fracture longitudinally along the keyway in the propeller or around the same; those that were caused through watermarks or corrosion immediately in front of or behind the after liners. The two former they need not at present discuss, seeing that they were undoubted fractures, and were generally the result of some undue strain. As to the latter, namely, those caused through corrosion and so-called watermarks at either end of the after-sleeve, he would desire the benefit of their experience and assistance in order to elucidate their primary cause and ultimate effect. Before investigating same it might be well to arrive at the usual basis for determining the length of propeller shafts. What they had to consider, therefore, was the necessary actual length of a propeller shaft, the diameter of course having already been fixed by Lloyd's and other registry societies. Many years ago certain investigations were made by our Government as to the best wearing substance for these shafts, and it was found after many experiments that a shaft fitted with a brass sleeve and the outer end running upon lignum vitæ gave the lowest frictional resistance, but it was also found necessary to have an inner brass liner or sleeve, fitted on the shaft in way of the stern gland to carry it. The engineers of that date, therefore, submitted to the shipbuilders drawings showing the diameter of the coupling and stern gland, and requested the latter to inform them of the length of the stern tube necessary. This, of course, was a question of the fineness of the vessel aft, and averaged generally from 17 to 18 ft. Then and since it had been the custom to fix the stern

gland at a distance from the boss post of about the same extent, but latterly, owing to modern vessels having assumed a much fuller form aft, this necessity had been dispensed with, and it was now quite possible to fix the stern gland at a distance of from 6 to 8 ft. from the boss post. The average propeller shaft, however, in the meantime had not decreased in length, the average being about 24 ft. in length, and having two brass sleeves, the outer one running on lignum vitæ. In vessels built 15 to 20 years ago, owing to the fineness of form, the propeller was more immersed when in water-ballast than at present. In modern boats of the present type, owing to their being fuller aft and forward, the propellers were now in many instances only semi-submerged when in ballast, and sustained much greater strains than originally. Furthermore, owing to the deadweight capacity of the steamers having largely increased—say to the extent of 20 per cent.—the strains thrown on the propeller and also on the shaft were largely increased. Hence, perhaps, one of the reasons why we at the present day found so many shafts proving defective at sea. The author then exhibited photographs of several instances of defects which had occurred before actual breakage took place. Dealing with the construction of the propeller shaft itself, Mr. Aisbitt said that it was generally composed of three materials, viz., either forged scrap iron, forged scrap iron mixed with steel, or steel entirely. Forged scrap iron was assumed to be wrought iron pure and simple, and generally made up of faggots composed of cuttings from wrought iron plates with a number of punchings intermingled. In many instances these punchings were carefully scaled and cleaned, but he was afraid that in many others a considerable amount of dirt and foreign matter was present; hence some of the defects that they found in propeller shafts. In other instances some steel had perhaps unavoidably been mixed with the wrought iron, and, through non-amalgamation of the two properties, might cause local defects. Propeller shafts made of ingot steel pure and simple were undoubtedly homogeneous, but from the very fact of their being pure metal were more liable to corrosion from the presence of the copper contained in the brass sleeve. Both Mr. Manuel and Mr. Gravell advocated in their papers the substitution of steel shafts made from ingots, with which he (Mr. Aisbitt) was inclined to agree under certain conditions. Mr. Manuel referred in his paper to the fact of some of the propeller shafts being finished off to a smooth surface through water being thrown on them, and attributed some of the defects in them to this cause. This argument, the author thought, on due consideration was untenable, for this reason, that shafts which had least possible skin surface turned off them had proved more effective than those which had been forged larger and had afterwards been turned down, say, an inch and a half less in diameter. Several years ago the great trouble that existed with propeller shafts was principally through corrosion at the after end of the after liner; between it and the propeller, where exposed to salt water, deep corrosion occurred, and what was termed watermarks. However, owing to the introduction of a method of continuing the after end of the after liner into the propeller and carefully covering same with red lead, this trouble, he was glad to say, had become practically nil. The present difficulty, in many instances, was with the corrosion and water-mark so-called, which occurred at the fore end of the after liner in the stern tube. Sometimes a certain amount of corrosion was found at the after end of the forward liner, but this was not of frequent occurrence or of great extent, the principal difficulty being with the corrosion or watermark at the fore end of the after liner. Many means had been suggested and adopted for overcoming this defect, one of which was that introduced by their fellow townsman, Mr. Jordan, of the Junction Dry Dock, of introducing a composition of red lead immediately under the fore end of the liner and in front of it, but this, although an improvement only, he thought, caused the galvanic action to be carried some further forward. Another improvement had been patented by Mr. Mudd, of the Central Marine Engine Works, Hartlepool, of covering the propeller shaft between the brass liners with an indiarubber sleeve supposed to be hermetically sealed on the shaft. A third idea was to wrap the shaft with fine marline between the two sleeves, coating same with pitch or tar. But all of those methods had the objection, especially the latter, that when drawing the propeller shaft the coating might be destroyed locally, and that at some future period it might unwrap and cause trouble in the stern tube. A further improvement had been suggested by several engineers of shortening the stern tube so that the after liner would extend to the stern gland—say 6 ft.—leaving the propeller shaft of the same length as usual—say 24 ft. Of this mode of improvement he would speak hereafter. His present point was, what was the cause of the watermark and corrosion so frequently found at the fore end of the after liner? Several years ago he investigated this matter, and was of the opinion, together with several others, that two forces were at work producing the so-called watermarks and corrosions found, namely: Firstly, mechanical; secondly, chemical or galvanic action. The mechanical action was assumed to be caused by the beating or hammering of the propeller shaft in the stern bush through slackness, say, when the clearance was worn to $\frac{3}{8}$ or $\frac{1}{2}$ in., causing a skin fracture on the shaft immediately in front of the after liner, and that the chemical or galvanic action of the brass would afterwards act upon this fracture and cause the marks as shown. However, from further investigation he was convinced that the so-called watermark was really attributable to chemical and galvanic or electrical action. His opinion was that, through the revolutions of the shaft on the lignum vitæ, a certain portion of the after brass sleeve or liner was ground away, and in doing so the copper, tin, or zinc forming the brass liner were dissolved, the light properties floating away, and the heavier copper being deposited on the inner end of the brass liner as found immediately adjacent to the exposed softer wrought iron. The salt water flowing over this almost pure copper naturally attacked the iron shaft, and caused the defects which they found. In concluding his paper, Mr. Aisbitt said: Lastly, as to what I would propose in order to obviate those defects which we have so frequently had experience of, I would suggest—firstly, that the stern gland be fitted at the fore end of the after liner, say, 4 to 6 ft. from the boss post, and that the peak bulkhead be cut, and the engineer in charge have access right up to this gland; or perhaps a better arrangement would be to forge the shaft larger in way of the stern bush equal to the diameter of the brass sleeve, and that the stern bush be lined with white metal instead of lignum vitæ. If the latter mode be adopted, it is, I think, absolutely necessary that the stern tube should be filled with oil or other lubricating matter, as wrought iron on white metal with water as lubricant has not proved so far successful. Furthermore, I should not advocate a long propeller shaft being carried with a second bearing inside of the proposed stern gland, as, should this be done, and the propeller shaft wear down on the outer end of the stern bush, which it is only natural to expect, the shaft will be bound at two points with the weight of the propeller on the outer end suspended at a considerable distance from the stern gland. My idea is that a short propeller shaft is more convenient to carry in the recess, and, if suitable means are adopted to allow of its giving at the after coupling in case of the outer edge wearing down, as is frequently done in the case of paddle ships, greater security will be obtained, even at the risk of breaking the after coupling bolts, so long as the centres of the two couplings are kept in line. I think that even if the propeller shaft was kept at its present length a great improvement would be effected by increasing it in diameter to that of the present brass sleeves, leaving the intermediate portion unturned and running same in oil on white metal. So far as running on white metal is concerned, I am convinced from the experience we have already obtained of using this material for main bearings of crank-shafts, &c., we have ample grounds for adopting it, while at the same time dispensing with the chemical action previously mentioned. In any case, whatever method is adopted, it lies with us all to devise some means by which the present serious defects in propeller shafts may be avoided.

(To be continued.)

Thistle.—On January 25th there was launched from the yard of Messrs. R. Williamson & Son, Workington, a steel barge built especially to carry grain, for Liverpool owners. On leaving the ways she was named the *Thistle*, and is of the following dimensions:—100 ft. by 23 ft. by 10 ft. 6 in. moulded.

The members of the North-East Coast Institution of Engineers and Shipbuilders met at West Hartlepool, on Saturday, January 15th, and visited the large engineering establishment of Sir Thomas Richardson & Co., inspecting particularly the electrical installation there. This firm were among the first to adopt electrical driving, and speak highly of the advantage derived. It is on the "multiphase" system.

BURNLEY'S ROZINAL SOLDERING PASTE.

A SOLDERING flux, which we understand is largely used in American factories, has been put upon the market here, under the above title, by Messrs. Beanland, Perkin & Co., of Leeds. This flux is in the form of a sticky paste, resembling salve or vaseline in appearance, and when applied to the surfaces to be soldered it forms a flux, which is said to be better than resin, without the waste and delay incident to the use of that substance.

It is claimed that it is particularly useful for dynamo manufacturers, as it can be used for soldering armature connections, commutator bars, or field connections; for wiring contractors, as wires can be soldered in half the time, and at half the expense; and for instrument makers, as it will unite the finest wires without oxidation or injury to insulation. It is also generally useful for all tin, copper or brass work. We understand it contains no acid or other substance injurious to wires or insulation. A special feature is that it does not blow away nor fall off the work, and hence is not wasted.

OBITUARY.

JOHN LAIRD.

THE announcement of the death of Mr. John Laird, J.P., the head of the noted Birkenhead shipbuilding firm of Laird Brothers, will be received with deep regret in shipbuilding and engineering circles generally. Mr. Laird died at his residence, Birkenhead, on Tuesday morning, January 25th, after a brief illness. He was in his sixty-fourth year, and although he had not been in robust health for some time, was well enough to take part in the proceedings of the Employers' Federation in connection with the engineers' strike, and was only confined to his residence for about a week.

He was the third son of the late Mr. John Laird, who for many years represented Birkenhead in the House of Commons, and whose father, William Laird, was the founder of the great shipbuilding firm with which the family is associated. Born at Birkenhead in 1834, he was educated at Winnick and Cheltenham College, and afterwards apprenticed for five years to a Brazilian merchant. During the Crimean war he visited Sebastopol and the military positions round about that fortress, and there gained a good insight into the engineering requirements of warfare. Upon returning home he and his elder brother William were taken into partnership by their father, and from that time Mr. John Laird has been largely responsible for the administrative side of the business. Though a busy man, Mr. John Laird, true to the family tradition, took a quiet but active part in political, municipal and other public affairs, but was singularly conciliatory in manner and highly esteemed by his political opponents. When Birkenhead's incorporation brought with it large duties extending over a vastly increased area, Mr. John Laird was elected a Town Councillor as a matter of course, and by common consent became the first Mayor, as his father had been its first member of Parliament. He was re-elected in the following year, and was Mayor a third time in 1885. He was a liberal contributor to local institutions, and from 1875 to 1879 was president of the Iron Trade Employers' Association of Great Britain. He leaves a widow, three sons, and three daughters.

JOHN HENDERSON THOMSON.

We have heard with great regret of the death of Mr. John Henderson Thomson, vice-president and ex-chairman of Council of the Institute of Marine Engineers, in his fifty-ninth year.

The deceased was in Stratford, at the Institute of Marine Engineers' reading room, on Saturday evening, January 15th, in apparently excellent health and spirits. He retired to rest on Saturday night without showing any change, but in the morning he was found dead, a smile on his lips indicating no struggle with death.

John H. Thomson was one of the originators of the Institute of Marine Engineers; he was, if not the first, one of the first to initiate the beginning of this society, which has now attained to an influence and importance not inaptly termed international, embracing the four quarters of the globe in its membership.

As chairman of Council, he was respected and esteemed, modest of his own opinions, as befits a chairman, and only expressing his personal view when required, to guide the conclusions in the pathway of progress.

As a member of committee he worked and laboured for the Seamen's Hospital at the Royal Albert Docks; as a Governor of the Royal Caledonian School, and as a supporter of the Scottish Corporation, his help and sympathy were ever ready for deserving cases of distress; as an active member of St. Luke's Church he is well known to many around in the district.

John H. Thomson was born in Newcastle in 1839, and was removed to Aberdeen in infancy, where after his school years he served his apprenticeship as an engineer, and ultimately joined the P. & O. Co., serving for about 20 years.

He left the P. & O. Co. as chief engineer in 1883, and joined his late partner, John Thomson, in the firm of A. & J. Thomson, coppersmiths, Victoria Docks, of which firm, on the death of his partner, which took place so recent as last October, he remained the sole member of the firm.

Miscellaneous.

Catalogue.—From Messrs. Elliott Brothers, of St. Martin's Lane, W.C., we have received an elaborate catalogue of electrical, optical, engineering and mathematical instruments. It is very fully illustrated and priced, whilst every facility is given for the use of the telegraph in giving orders. For not only is a different code word given for every grade of each instrument catalogued, but there is a special code shown at the commencement of the work to fit the ordinary A B C book for the special needs of customers. It is difficult to imagine any instruments for use either at sea, or in the laboratory or observatory at home, which are not here offered, whilst a very high standard of workmanship and design is guaranteed by the large number of medals and awards which the firm has received.

Marine Engineers' Examination.—At the examination for Extra First Class Engineer, held on January 11th, 12th and 13th, nine candidates were successful:—Messrs. W. L. McGregor, R. McLinlock, E. B. Taylor, of Glasgow; J. R. Dunn, of Dundee; Richard Abbott Jones, of Swansea; J. H. Marsden, of London; and R. Shilaton, of Tynemouth, being prepared by Mr. W. H. Thorn, 5, Waterville Terrace, North Shields. Five out of the above seven passed the first time of going up, making 49 successful pupils from the above school. This constitutes the highest success ever attained by any marine engineering school in the United Kingdom.

Speed Indicators.—In our issue of December last we gave a description of Metcalfe's Patent Speed Indicator, and we made reference to the want of such a device in the Royal Navy. We now understand that such want has been supplied some time ago by instruments having the same object in view as the apparatus described, which have been manufactured by the well-known firm of Messrs. Chadburn & Son, of London, Liverpool, Newcastle, and Glasgow. We understand that some few ships of the Royal Navy have been fitted with these instruments and give every satisfaction.

The Howden System of Forced Draught.—We are glad to see from a pamphlet, just issued by Messrs. James Howden & Co., of Glasgow, that the demand for and number of installations of this now well-appreciated system of forced draught is rapidly on the increase. The number of installations are now 630, not including steamers fitted by the licensees of the system in America during 1897. When the contracts now in hand are completed, it is stated that Howden's system will be applied to boilers supplying steam for 1,603,900 I.H.P. The list of steamers now fitted with this apparatus include those of all the leading lines of Glasgow, the Peninsular and Oriental Steam Navigation Co., and other leading firms of London and Liverpool, and also colonial and foreign lines, and the battleships and gunboats of the Dutch Government. The firm go so far as to confidently anticipate its adoption to steamships universally.

The Navy League.—Lord Drogheda presided at the third annual meeting held at the Royal United Service Institution on January 26th, and in moving the adoption of the report referred to the satisfactory progress made by the league since its last annual meeting.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from December 22nd, 1897, to January 24th, 1898 :—

Bennington, John W., fleet engineer to the *Hermione*, to date January 27th.

Blake, A. V., chief engineer, has been advanced to the rank of staff engineer in Her Majesty's fleet.

Collings, A. E., engineer to the *Hunter*, to date December 29th.

Crowley, Edward A. E., chief engineer to the *Renard*, to date January 13th.

Cudlip, E. W., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Cudlip, Edwin W., chief engineer to the *Bruiser*, to date December 1st.

Davies, William R., engineer to the *Havock*, undated.

Eldred, Charles E., engineer to the *Antelope*, to date November 5th.

Elgar, George H., assistant engineer (temporary) to the *Diadem*, to date January 7th.

Evans, Alfred, assistant engineer to the *Speedy*, to date January 7th.

Gavey, Arthur, (probationary) assistant engineer to the *Charybdis*, to date February 1st.

Greetham, Charles T. D., engineer to the *Doris*, to date January 21st.

Griffin, D., staff engineer, has been advanced to the rank of fleet engineer in Her Majesty's fleet.

Haggarty, George A., chief engineer to the *Arrogant*, to date January 27th.

Harding, Charles A., chief engineer to the *Pembroke*, additional, for duty in the *Vernon*, to date January 8th.

Howell, Llewelyn, assistant engineer to the *Hood*, to date January 5th.

Johnson, John R. D., fleet engineer to the *Glory*, to date January 10th.

Kerswell, George T., engineer to the *Alarm*, to date December 29th.

Kestell, Edwin R., engineer to the *Arrogant*, to date January 27th.

Lawton, W. R., engineer to the *Seahorse*, to date January 21st.

Leahy, James P., engineer to the *Victorious*, undated.

Lecky, Charles B., engineer to the *Gleaner*, undated.

Michell, John L, staff engineer to the *Pembroke*, additional, to date January 8th.

Morris, George H., engineer to the *Tamar*, additional, to date December 29th.

Onyon, William, engineer to the *Hasty*, undated.

Pascoe, G., engineer, has been promoted to the rank of chief engineer in Her Majesty's fleet.

Pascoe, George, chief engineer to the *Hebe*, to date January 1st.

Radford, Henry G., assistant engineer (temporary) to the *Arrogant*, to date January 27th.

Ricketts, Hugh H., assistant engineer to the *Arrogant*, to date January 27th.

Riley, William H., fleet engineer to the *Pembroke*, additional, as engineer overseer at the works of the Fairfield Shipbuilding and Engineering Co., to date January 8th.

Roe, Charles E. M., (probationary) assistant engineer to the *Hood*, to date January 5th.

Roger, Cuthbert R., engineer to the *Penelope*, to date January 13th.

Ryder, John F., fleet engineer to the *Repulse*, to date January 8th.

Shattock, Thomas, engineer to the *Blenheim*, to date January 7th.

Stocker, Percy, assistant engineer to the *Racoon*, to date February 1st.

Taylor, George R., chief engineer to the *Cambrian*, undated.

Thomsett, Frank D., engineer to the *Racoon*, to date February 1st.

Travis, Albert E., engineer to the *Diadem*, to date January 7th.

Webster, George P., engineer to the *Fervent*, to date January 7th.

HOAR & BROWN'S HARDWOOD MARKET REPORT, JANUARY 22nd, 1898.

TEAK.—A retrospect of the year 1897 has disclosed a steady business with prices well maintained up to about October. The engineers' strike made a material difference to the volume of business during the latter half year, and towards the close values declined considerably for timber; and the outlook for the new year shows no decided improvement. The stock is fairly heavy, but the Admiralty requirements, which are considerable, will practically exhaust the major portion of the good quality wood now here.

PLANKS.—Stocks were light up to about March, and prices rose, causing shippers ultimately to over-stock the market. The demand continued fairly brisk, and this no doubt induced importers to place large quantities of second-class wood upon the market, which mostly met with "without reserve" competition, and sold at low figures. The market at present is over-loaded and values may decline slightly, but the consumption keeping up might enable shippers to continue obtaining prices much upon the old lines.

MAHOGANY.—The close of the year brings to stocktakers of large early holdings a somewhat serious depreciation in values, the difference being quite 25 per cent. in many cases, this being a special feature in African wood, which has lately continued to pour into the market, affecting other descriptions. The shipment of planks and boards from America also prevented much business in small logs, and a continuation of this will certainly weaken the market. Large Tobasco and Honduras would have suffered by the enormous influx of African, but for the railway companies, who kept prices firm by issuing their tenders for delivery in the log exclusive of African.

HONDURAS.—Arrivals were very heavy and exceed any since 1893; there was, however, a solid demand, and prices remained firm throughout the old year, values continuing so at the present time. It is expected that prices will be maintained in consequence of the coming large demand from the Admiralty.

TOBASCO.—Shipments have been unusually light, and since October last there have been no fresh arrivals, consequently stocks are small. The demand for the early part of the year will be fairly good, and the Admiralty supply, which is extensive, will no doubt cause Tobasco wood to become firmer.

CUBA.—The importations of this wood has decreased owing to the disturbed state of the district, and prices have gone up to almost prohibitive point. The demand has been very active, and considering the length of time it will take before general operations can be commenced again, the call for Cuba will for the present absolutely die out for ordinary purposes.

NICARAGUAN.—The quality of this wood finds favour; the importations have not been large, but a decline in prices has taken place. Some considerable shipments of planks and boards have come forward and met with a ready sale.

TECOLUTLA.—The arrivals have been unsatisfactory as to condition, and forced sales were adopted in order to clear the shaky stocks, low prices being the result. The market was not overburdened with this class at the commencement of the year, but since a cargo has arrived, containing much inferior quality.

PANAMA.—Importations were light, but the wood still arrives in a very shaky condition. The few good logs found among the parcels fetch fair values, but there is a great difficulty in selling the remainder.

AFRICAN.—This wood has completely spoiled the market for other descriptions owing to the very large increase in shipments, which has caused a considerable drop in prices. The consumption has been large, and the demand is still active. Prices for good stock appear to have gained their minimum; faulty and bad tops are difficult to place, and values may fall even lower if the large importations continue.

ST. DOMINGO.—The great scarcity of Cuba wood causes active competition in this description, and full prices are being paid for the small stock remaining. The arrivals have been upon the usual average, but the market could have done with twice the quantity in the absence of Cuba.

CEDAR.—There were no shipments made from Cuba, but other ports were active in sending forward small consignments, which appeared sufficient for general purposes. The boat wood was the only description which fell short, and high prices were paid.

PARAGUAY.—The demand for this is slack, the importations were short of previous years, and stocks are large with prices

a tone lower. The wood has been pushed to take the place of mahogany, but the low prices of the latter have prevented this taking effect.

WALNUT.—LOGS.—The importations, although short, cause no improvement in prices. Very low rates are ruling for the large quantities of small logs received. Throughout the year a steady demand has continued for larger sizes, and such logs as are fit for the knife. The fall in the lumber trade has cut very much against the logs, and made practically no demand for anything unless of superior grade.

PLANKS AND BOARDS.—Lower quotations than ever have been made from the other side, which have resulted in large shipments, causing the old landed stocks to be cleared at very low and unprofitable rates. First-class, good average parcels, which have not been too freely imported, realised extremely well, and prices are still high for such goods.

OAK.—LOGS.—Very low rates have ruled for the general supply, and the trade are not particularly anxious in buying logs excepting those of sound character and of special sizes.

PLANKS AND BOARDS—have suffered very much by the excessive supply, and low grades have changed hands particularly cheap. There does not appear to be any chance of the market improving immediately.

WHITEWOOD.—LOGS.—As in most of the American goods, prices have declined, and logs are very poor stock for holders, lumber taking precedence.

PLANKS AND BOARDS.—The lowest prices yet known have been ruling during the year, and with the enormous quantities now here and arriving, there is likely to be a further fall in quotations.

PADOUK.—The United States have made a clearance of the major portion of the stocks, very little indeed remaining on hand. Prices have risen lately in consequence. There is no prospect of any further shipments being made immediately.

KAWRIE PINE.—The wood has come largely into favour, and the importations have increased, values having slightly risen. Stocks are now comparatively small, but sufficient for present requirements. The market needs feeding judiciously.

GREENHEART.—The sales throughout the year show no activity either in prices or quantity; quite a dormant trade has been carried on with the small stocks, which have been ample to supply enquiries with.

SEQUOIA.—At the commencement of the year prices were fairly firm, but upon forced sales being made values declined somewhat. The demand has shown some activity lately, and quotations have improved slightly. Stocks are still quite heavy enough, and no further shipments are required in the near future.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

AFTER about 29 weeks the sad and tedious engineering struggle is practically at an end, and by the time this Journal is in the hands of its readers, the strikers and the locked-out will be back in their places in the workshops. It is feared, however, that many of the old hands will have some difficulty, or may never regain their former positions owing to the extent to which "non-union" and "free-labour" hands, and new apprentices have been welcomed and encouraged during the struggle, and to the degree of satisfaction which young men, who were merely labourers before, have been giving during the strike in positions which that event has enabled them to assume in the machine shops.

Balloting for the second time is at this moment (25th ult.) taking place amongst the branches of the society on the Clyde, as elsewhere, as to the acceptance or non-acceptance of the employers' terms as adjusted at the Westminster Conference. The result, however, is a foregone conclusion, as the officials of the allied trades involved in the struggle, and even those of the Amalgamated Society itself have recommended their acceptance in no uncertain terms as the best of a bad job. In the fulness of time the leaders of the society have realised the strength of the masters' combination, and are accepting, and recommending the acceptance of the inevitable.

So far as the Clyde workmen are concerned, they never have been intensely desirous of agitating for the eight hours' day, but their society once being in for it, and all the issues said to be involved in the present struggle, they have stood by their leaders in a thoroughly soldierly fashion, mistaken and rash as the latter have been. The step taken by the Fairfield Co. in throwing in their lot with the federated employers at the last, and locking out the men they have employed all through, has had no small effect in precipitating the end. This blow, and the fact that non-union men—if not in many cases union men as well—were breaking away from the ranks of the strikers, have had much to do with enforcing the sense of defeat on the A.S.E. leaders.

The Fairfield Co., not having had their operations impeded by the engineering dead-lock, were enabled to fix the date for the launch of H.M.S. *Argonaut*, and this took place accordingly on Monday, the 24th ult. The christening ceremony was performed by the Countess of Hopetoun; Sir W. H. White, K.C.B., was present along with other representatives of the Admiralty. The *Argonaut* is a first-class cruiser of 11,000 tons displacement with an I.H.P. of 18,000 tons. Her armament will comprise 12 6-in. guns in casemates; four 6-in. guns in shields; twelve 12-pounders; two 12-pounders (boat and field); three 3-pounders, eight Maxim machine guns, and two 18-in. submerged torpedo tubes.

The directors of the Fairfield Co. have lent two fine models to the Royal United Service Institution Museum, in Whitehall, viz., H.M.S. *Diadem*, the latest type of first-class cruiser, and H.M.S. *Diana*, the latest type of second-class cruiser. This interesting collection now contains a model of each of the latest classes of battleships and cruisers.

Messrs. A. & J. Inglis, of Pointhouse, are reported to have received from the British India Steam Navigation Co., Limited, an order for the construction of two large steamers of a type similar to others already built for this company.

Messrs. Ritchie, Graham & Milne, of Park Shipbuilding Works, Whiteinch, have booked orders for a stern-wheel steamer 102 ft. in length, and four steel barges for the African Lakes Corporation; one stern-wheel steamer 90 ft. long for Africa, one stern-wheel steamer 60 ft. long for South America, and one steam trawler for London owners.

The Clydebank Shipbuilding and Engineering Co. have been briskly booking new orders since the New Year began. In the matter of size the most important order is that for two steamers, each of 8,500 tons deadweight carrying capacity, received from Messrs. Turnbull, Martin & Co., London and Glasgow. The new vessels—similar to two others ordered from builders on the North-East coast of England—are intended for the New Zealand frozen meat trade, and will be fitted up with extensive refrigerating apparatus and insulated compartments for this purpose. The company have also undertaken to construct a swift twin-screw Channel steamer for the fleet of the London and South Western Railway Co., to be engaged alternately in the Channel Island service or that of the port of Havre. The new vessel will be larger and more powerful than the *Frederica*, *Columbia*, and *Alma*, of the same company's fleet, and her speed will also be a marked advance on that of those vessels. She is guaranteed to attain a speed of as much as 19½ knots on a run of six hours' duration. The guaranteed speed of the *Columbia* and *Alma*, which vessels were built about three years ago, was 18½ knots, but one of these attained a maximum speed of 19·25 knots on one occasion. The two sets of engines for the new vessel will be on the triple-expansion principle, with four cylinders and four cranks, designed with special attention to balance of parts in order to minimise or prevent vibration. The specification, which has been prepared by Professor J. Havard Biles, of Glasgow University, also provides for water-tube boilers if a type can be agreed upon and approved by the Board of Trade and the owners and builders.

The Clydebank Co. have also been instructed to build a new paddle steamer for the Thames excursion traffic, which will be larger, but similar in general design to the favourite Clyde passenger steamer *Glen Sannox*, produced from the Clydebank stocks three years ago, for the Glasgow and South-Western Railway Co. While Margate is to be the limit of most of the excursions undertaken by the new vessel, the route will be differently arranged from that at present organised. For Mr. W. C. Donaldson, of Cochno, the chairman of the Clydebank Co., a fine steel steam yacht is being laid down in the company's establishment. She will be 190 ft. long, and will have engines and boilers of the most approved construction and design to drive

her 14½ knots. The vessel is intended to be ready for the early summer. All these new contracts, together with the important warship and mercantile tonnage already on hand, will keep the Clydebank works well occupied for some time to come. The company, it is reported, has recently given out an extensive contract for ship's plates, to be delivered over a period of two years.

Messrs. Russell & Co., Port-Glasgow, who for many years built nothing but sailing vessels, but have for some years past directed their energies mainly to steamship construction, recently received from shipbuilders in France, who have six large sailing vessels on hand, an order for the making and fitting of all the spars for these vessels. This is probably the largest order of the kind ever placed with a British firm. The first set of spars has already been consigned to Rouen, and workmen from Messrs. Russell's yard have gone to fit them up.

Messrs. Murdoch & Murray, shipbuilders, Port-Glasgow, have contracted to build a steel screw cargo steamer of 700 tons gross, for owners in Dublin. Compound surface condensing engines will be supplied by Messrs. Lees, Anderson & Co., Glasgow. This vessel, which will be similar in design to several already built by Messrs. Murdoch & Murray, will be employed in cross-channel traffic.

Messrs. Carmichael, McLean & Co., shipbuilders, Greenock, who have now a great deal of work on hand, have received, since last month's Notes were written, orders for several vessels; one a steel screw steamer, single deck type, poop bridge and forecastle, to carry 2,100 tons, and to be fitted with triple-expansion engines; another, a steel screw steamer of moderate dimensions, for a Glasgow firm.

Messrs. Scott & Co., Greenock, contracted about the end of December, with the Ocean Steamship Co. (Messrs. Holt & Co.), of Liverpool, to build two steamers of 6,700 tons gross, with engines of 4,750 H.P. The dimensions of the steamers will be;—Length, 440 ft.; breadth, 52 ft. 6 in.; depth, 33 ft. 6 in. All the latest improvements for loading and discharging cargo are to be brought into service.

At Irvine, on the Ayrshire coast, the Irvine Shipbuilding and Engineering Co., Limited, have now got fairly started, and have all berths fully occupied and several important contracts on their books to begin with. About the middle of the month the company had their first launch, since starting operations in August last, this consisting of two steam trawlers, each of 160 tons, built to the order of Messrs. Hagerup, Doughty & Co., of Grimsby. There was a large turn-out of spectators and a banquet followed the successful double launch. The company have on hand, or to begin, other eight steam trawlers of similar size and three screw steamers, one of 600 tons for Messrs. J. & P. Hutchison, of Glasgow, one of 600 tons for Liverpool owners, and one of 700 tons for owners in the South of England.

Messrs. S. McKnight & Co., shipbuilders, Ayr, in addition to the orders booked last month, have secured the contract for a screw steamer of about 1,000 tons and 1,000 H.P. for East Coast owners. The powerful hauling-up slip of the company is also being briskly requisitioned as usual for the repair and overhaul of vessels of all classes.

The trade of the past year at the Fifeshire port of Burntisland—especially as regards exports—has exceeded in volume anything hitherto recorded. The import trade has proved to be little more than stationary, but with the addition to the dock facilities, and especially to the deep-water accommodation which is now being proceeded with, the position of the port as regards incoming trade will very much improve. The coal shipping trade, upon which the docks almost wholly depend, has been brisker than in any previous year, the result being the export of 886,944 tons of coal, representing an increase of as much as 80,710 tons over the previous best year, viz., 1886, when the figures were 806,233 tons. Ever since the opening of the dock at Methil in 1887, which practically put a stop to the shipment of the East of Fife coal at Burntisland, the trade has shown a shrinkage from the totals recorded during the hitherto best year of 1886, but owing to the gradual extension of the West of Fife collieries, the ground lost during the ten years has now apparently been more than recovered. The total number of vessels dealt with during the year was: steamers 793, and sailing vessels 228, the aggregate gross tonnage being 886,944 tons. This shows an increase, over 1896, in the number of steamers loaded, of 116, and of sailing vessels 12. A much larger proportion of the steamers were of heavier tonnage than usual, and this, together with the expansion of the West of Fife coal export, may be held as justifying the forward movement on the part of the harbour authorities with regard to increasing the dock accommodation and the depth of water. The latter point especially is recognised as of great importance, as the main obstacle to the further growth of the trade outwards as well as inwards is the danger of the increased and still increasing size of steamer getting neaped, except at spring tides. The harbour authorities, in view of a graving dock having been included in the scheme of improvements, are arranging for the lease of ground in the vicinity to a company whereon to erect workshops and other works entailed in the business of ship repairing. With this in prospect, together with the progress being made with the new dock, the future seems very bright for both town and harbour.

At Kirkcaldy recently, representatives of the various industries, as also of the new coal-fields at present being developed in the neighbourhood, met together and conferred upon the proposed new harbour and railway accommodation at "the lang toon." The general opinion was that a new harbour and railway were required, and it was resolved to apply to the ensuing Parliament for a Bill for this purpose, the money to promote the Bill being all subscribed at the meeting. A large committee was appointed to deal with details and make further arrangements.

Edinburgh apparently is very reluctant to take up the proposal of holding another International Exhibition. The promoters of the scheme for one to be held in 1899 sent out about 130 circulars to firms and citizens of standing with a view to petitioning the Town Council for its countenance, but out of the whole of these only two were returned signed, although there was no question of guarantee involved. A meeting of the promoters took place January 12th, at which the unpromising character of the movement was partly admitted.

At Dundee, shipbuilding is in a decidedly healthy and flourishing condition. At the beginning of the year there were about a dozen vessels on the stocks, representing a gross tonnage of about 7,000 tons. Since that time orders for as many as five new vessels, all of considerable size, have been received, almost doubling the aggregate tonnage on hand. Messrs. Gourlay Brothers & Co., of Camperdown yard, received an order from Messrs. James Currie & Co., of the Leith, Hull and Hamburg Steam Packet Co., for a steel-screw steamer of about 1,500 tons carrying capacity, similar to the one placed with Messrs. Ramage & Ferguson, of Leith. They also received an order from the Finska Steamship Co., of Helsingfors, Finland, for two steamers each 280 ft. in length and similar in type to the *Wellamo* and *Oihonna* now being completed by them for the same company. Amongst the other contracts Messrs. Gourlay have on hand is one steamer for the General Steam Navigation Co. The Caledon Shipbuilding Co. have contracted to build a steamer for Messrs. Leyland & Co., of Liverpool, and have also arranged to supply new engines and boilers and otherwise thoroughly overhaul the steamer *Pharos* belonging to the Northern Lighthouse Commissioners. Amongst the other work which the Caledon Co. have on hand—sufficient, it is understood, to keep them busy for 12 months—are four vessels for Wilson, Sons & Co., of Hull, one for the Clyde Shipping Co., and one for Messrs. Langlands & Son, Glasgow.

That Dundee is pleased with the results attending its steam trawling venture, in which ex-provost Hunter and other leading citizens have taken an active interest, would appear from the fact that a company is in course of formation to be called the Dundee Steam Trawling Co., Limited. The capital is £25 000 in £5 shares, and is already all taken up. The management of the new venture will devolve upon Mr. William High, who has for long advocated the importance of fostering the trawling industry from Dundee. The company meanwhile will run the trawlers *Marion* and *Rosslyn*, which will also be used for towing purposes. It is in contemplation to establish an ice factory, curing yards, &c., in connection with the company's other operations, and confidence is felt in the company being able to profitably develop the industry to the benefit of the shareholders and the community at large.

For the vacant post of superintendent of the Tay Ferries, caused by the retirement of Captain Methven, over 50 candidates applied, the applications being from Dundee, Aberdeen, and various seaport towns in the East of Scotland, as well as from Glasgow, Paisley, Ardrossan and other West of Scotland towns, while, at least, one applicant hailed from the metropolis. The Ferries committee have fixed the limit of age of candidates at 45 years, and have reduced the short list to seven names. The election will be made shortly.

Within recent times there has been considerable activity amongst engineering, shipbuilding and other firms on the Clyde and elsewhere with respect to the re-construction, extension, and more modern equipment of their premises. Sir William Arroll & Co., of Dalmarnock Iron Works have recently turned out, or have in hand, a large number of contracts for re-construction and addition to engineering works, foundries, boiler works, and others of a similar character. For the Clydebank Shipbuilding and Engineering Co. large additions have been provided, including new joiner shops and mould loft, and at the present time they have on hand a new saw-mill of the most modern construction. For the Fairfield Co. entirely new joiner and cabinet-making shops have been erected, and at present a new boiler shop, 400 ft. long, new brass foundry and finishing shops are on hand. For Messrs. David Rowan & Sons, engineers, Glasgow, large additions have been made to the engine and boiler shops, and for Messrs. James Howden & Co., Scotland Street, entirely new works of large dimensions are being erected. Messrs. The Wallsend Slipway and Engineering Co., have had its constructional material supplied for extensions to their premises, while for the new works of Parsons' Marine Steam Turbine Co., of Newcastle, Messrs. Arrol & Co. are erecting machine shops, pattern shops, smiths' shops, brass foundry, &c. They are also erecting a large new foundry for Messrs. Fullerton, Hodgart & Barclay, of Paisley, and an addition to the works of Messrs. Loudon Brothers, the well-known machine-tool makers, of Johnstone.

By the death of Mr. Peter Denniston a well-known personality in Glasgow shipping circles has passed away. The sad event took place on the morning of the 21st ult. at his private residence in Kelvinside, Glasgow. Deceased, although only 48 years of age, had for the past three or four years been prevented from taking such an active part in business affairs as formerly on account of failing health. Besides being head of the firm of Messrs. Peter Denniston & Co., shipowners and ship insurance brokers, managers of the Island Line of sailing ships, and of the Scottish Ship Share Investment Co., Limited, the late Mr. Denniston was Hawaiian Consul in Glasgow. He took a great interest in shipping matters in general, but particularly in all matters pertaining to sailing ships.

Mr. James C. Burns, Glasgow, son of Lord Inverclyde, has unanimously been selected as prospective vice-president of the Chamber of Shipping of the United Kingdom. His name will be formally submitted in this connection at the annual meeting of the Chamber to be held this month. As the vice-president of one year becomes the president in the succeeding year, it follows that Mr. Burns (who is still in the thirties) will become President of the Chamber of Shipping in February, 1899.

Mr. Robert T. Napier, who has recently retired from the co-partnership of Messrs. Napier, Shanks & Bell, shipbuilders, Yoker, has commenced business as a consulting engineer at 75, Bothwell Street, Glasgow. Mr. Napier, who is a son of the late Mr. James R. Napier, celebrated as a physicist, is well known in Glasgow and on the Clyde. He served on the Council of the Institute of Engineers and Shipbuilders for some years, and was recently admitted on his first application a member of the Institute of Civil Engineers. Mr. Napier will make a speciality of investigating and reporting on mechanical matters and difficulties, including such as involve knowledge of heat and of inorganic chemistry.

Mr. Percy A. Hillhouse, B.Sc., who has for some time been in the employ of the Clydebank Shipbuilding Co., has been selected to fill the post of Professor of Naval Architecture in the Imperial University of Tokio, Japan, which appointment, as was stated in one of the leading articles in our last issue, was practically in the disposal of Dr. Henry Dyer, of Glasgow, who was for a number of years, in its early history, Principal of the Tokio University. Mr. Hillhouse, who is a son of Mr. Archibald Hillhouse, of the Caledonian Railway Co., is a graduate of Glasgow University, and received his practical training in the shipbuilding establishments of Messrs. A. & J. Inglis, of Pointhouse, and of the Clydebank Co. He sails early in the present month for Japan to take up the duties of his appointment.

In the "Honours" Examination in Naval Architecture, held in May last under the auspices of the Government Science and Art Department, the first place in the United Kingdom has been won by Mr. James Montgomery, a Dumbarton student. Mr, Montgomery also gained the class prize, and was awarded a special prize by the governors of the Glasgow and West of Scotland Technical College for the general excellence of his work. He was tutored by Mr. James R. Jack, lecturer in Naval Architecture at the above College, and a member of the draughting staff in Leven Shipyard, Dumbarton. It is noteworthy that this is the second occasion during the last four years that this honour has come to Scotland, and in both cases the successful students were from Dumbarton, and members of Mr. Jack's classes in the Glasgow College.

At a meeting of the Glasgow University Engineering Society, held on the 20th ult., Professor Barr in the chair, a paper was read by Mr. Matthew Paul, M.I.M.E., of Messrs. M. Paul & Co., Dumbarton, on the subject of "Failures." Numerous instances of the inability of machines to fulfil the purposes for which they were designed were quoted, and the reasons of failure, and the alterations which were required to be made pointed out. The paper dealt with various important points in the design of steam engines, air-pumps, feed-pumps, fans and other machines, and was illustrated by diagrams.

The Watt Anniversary Lecture which should have been delivered at Greenock as usual on the evening of the 21st ult., has, owing to the illness of this year's lecturer, Professor Thorpe, been postponed till the 11th March. The anniversary dinner, however, was duly held in the Windsor Hotel, Glasgow, on the evening of Saturday the 22nd ult. Mr. George Russell, president of the Institute of Engineers and Shipbuilders, occupied the chair. Mr. Robert Caird, of Greenock, proposed the toast of the "Navy, Army and Reserve Forces," which was acknowledged by Sir William White, K.C.B., Colonel Chermide, and Mr. Archibald Denny, Lieut.-Col. of the Dumbartonshire Volunteers. The principal toast, "The Memory of James Watt," was proposed by Lord Kelvin. Including the guests, there was a gathering of about 240 persons, embracing many of the most eminent Clyde engineers and shipbuilders.

THE TYNE.

(From our own Correspondent.)

Shipbuilding.—The trade outlook in the first month of 1898 is, in a very high degree encouraging, to all whose interests are connected with the shipbuilding and engineering trades, the only cloud upon the horizon being the continued trouble in the latter industry, which, it may be said, affects the former to an equally prejudicial extent. At the time of writing the end of the trouble appears to be in sight, and news of a definite settlement is being hourly awaited. The eight hours' claim is withdrawn, and there is no longer any doubt that upon that point the men are beaten absolutely, as from the first we reiterated that they would be. Upon the still more important question of the management proposals, however, the men and their leaders have adopted an attitude of non-compliance, though the evidence cannot be ignored that these proposals were agreed to. Luckily for all concerned, this futile opposition can only be maintained for a very brief period, and we do not think there will be much risk in hazarding the prediction that by the time these Notes are in print, the greatest labour war the world has yet seen will have come to an end, and the men—or as many of them as room can be found for—will again be engaged in the meritorious business of getting a living by the proper use of the attributes with which nature and circumstances have provided them. We say further, that when the heat of the conflict has had time to subside, the men themselves—or at all events, all of them who are not irreconcilable—will feel something akin to gratitude towards the employers for the gallant stand they made in defence of the country's trade, and the principle of just dealing between man and man.

The preparatory work in connection with the projected enterprise of establishing a new shipbuilding and engineering business at Wallsend is being pushed on with extraordinary vigour, and the place will be ready for a start long before the time indicated by public anticipation. In matters of this kind the public is disposed to judge from experience; but there appears to be an energy developed in this particular instance which puts all previous performances in the way of getting over initial difficulties into the shade, and leaves no room whatever for comparison.

The new works and yard are being expresely erected and laid out for the building and equipment of high-speed vessels, to be designed and engined on the principles adopted with such marked success in the experimental boat *Turbinia*. The extraordinary performances in the matter of speed that have been recorded in respect of this little vessel need not here be particularised, but we have little hesitation in stating our belief that when vessels of

larger size are fitted with the "Parsons' Steam Turbine Engines," the trials will show even more remarkable results.

Messrs. C. S. Swan & Hunter are making excellent progress with the great pontoon ordered for Stettin, and there is little reason to doubt that in the execution of this contract the firm will eclipse their achievement last year of turning out the Havana pontoon dock in the shortest time on record. In the shipbuilding department, the firm have six vessels in progress and two in the water being fitted out. There is also an old vessel of large size undergoing an extensive overhaul.

Messrs. Hawthorn, Leslie & Co. are reported to have a mail boat to build in addition to the two vessels for the Colonial meat trade, mentioned in these Notes last month, It is also understood that the firm have arranged with Messrs. Doxford, of Sunderland, to build a large steamer of the "turret" type. There are other orders spoken of, and on the whole there appears to be no doubt that the firm have a busy time before them.

Messrs. Wigham Richardson & Co. are fitting out beside the yard the large steamer *Tannenfels*, which constitutes the firm's latest contribution to the fleet of the Hansa Co.; and they have four or five other vessels on the stocks besides one, to undergo repairs in the water. At Messrs. Stephenson's yard work continues plentiful, there being three vessels on the stocks in addition to the floating wharf which they are building for Messrs. Cory & Son.

Messrs. Armstrong, Whitworth & Co. are reported to have received an order for another Japanese battleship, and, besides six vessels on the stocks at the Elswick yard, there are two large cruisers ready to launch at their Low Walker establishment. Among other merchant vessels building at the last-mentioned yard is one of exceptionally large dimensions for owners at Amsterdam. Messrs. Wm. Dobson & Co. have commenced the building of a large steamer for Russian owners, and have two others on the stocks, one of which is expected to be launched in the course of a few days.

The Jarrow yard of the Palmer Shipbuilding and Iron Co. is just now more fully occupied with vessels in course of construction than it has been for a long time previously. Most of the vessels are of exceptionally large size, and almost all are of superior type, and will be equipped in a manner to fit them for the special trades in which they are to be employed. The river space fronting the yard is also thickly occupied with war and merchant vessels receiving their equipment of machinery and accessories, or waiting "turns" to get under the sheerlegs. The company's Howdon yard is still unoccupied; but a number of men are employed there "clearing up," and it is quite on the cards that the machinery may be again set going before the year is far advanced.

The Tyne Shipbuilding Co. are putting the finishing touches to the fine steamer *Tremont*, which has been built to the order of Mr. E. C. Thin, of Liverpool, and they have three other vessels of large size in progress on the stocks. The neighbouring firm, Messrs. Clelland, are busy with repair work, in which line of business they have been very steadily employed during the whole of last year.

At the yard of Messrs. John Readhead & Sons there are two large vessels in course of framing, and two others in the plating and commencing stages, respectively. At the sheerlegs there is being fitted out the fine steamer *Trelyon*, built to the order of Messrs. Hain & Son, St. Ives, and which is the 32nd vessel ordered by that firm from Messrs. Readhead. We think this must surely establish a record, as it seems most unlikely that any other instance can be named of a firm of owners relying so exclusively over a stretch of years on one firm of builders for their requirements.

The repairing yards at South Shields (including Messrs. Readhead's) appear to be just now very busy, and several repair contracts of importance are in course of execution.

Engineering.—Since the resumption of work, after the New Year holiday period, very strenuous efforts have been put forth at the different marine engineering establishments to accelerate production, and we are pleased to learn that in every instance these efforts have been distinctly successful. The aggregate number of operatives employed has been substantially increased, and every day—though the official settlement of the strike has not yet been declared—further additions are being made. The engineers on strike would do well to "throw up the sponge" without further loss of time and offer themselves for work on the conference terms, while there is yet any room for them.

At the St. Peter's Engine Works there is a large cruiser receiving her equipments of machinery, and both here and at the Neptune Works very satisfactory progress is being made with the contracts in hand. The arrangements for obtaining the best results out of the existing resources at the North-Eastern Marine Works, Wallsend, are said to be very effective, as also are the arrangements for a similar purpose at the Wallsend Slipway Works. The fine steamer *Orient*, of the Orient line, is just now being supplied with new boilers at these works, and is also having her engines fitted with new cylinders and other accessories, to put them in conformity with the triple-expansion design. There is also at the works a large new steamer, ordered from Messrs. C. S. Swan & Hunter, by Messrs. Wilson, of Hull, which is to be fitted with machinery by the Wallsend Slipway and Engineering Co., Limited.

In the smaller engineering works business is fairly active, and locomotive establishments are doing tolerably well. Brass and copper works are pretty busy, Messrs. Watsons' Works, Walker Gate, being, perhaps, the most actively employed in the district. Local iron works are kept very fully going, and the steel works at Elswick and Newburn are showing considerable activity. Chain and anchor works are only moderately well employed, the bulk of the work, so far as these closely allied industries are concerned, having apparently been transferred to Staffordshire. Bolt and rivet works are kept moderately busy, and many of the forges are very actively employed. Electrical works continue to be kept busy, and at Messrs. J. H. Holmes & Co.'s establishment there are as usual a number of ship-lighting contracts in hand.

In the iron foundries business is still somewhat slack, but an early improvement is confidently looked forward to.

Blyth.—Since the opening of the new graving dock, of which a brief description appeared in the January number of the MARINE ENGINEER, the attention of shipowners has been more than ever directed to the docking and repairing facilities to be met with at this rising port. The new dock referred to forms the third belonging to the Blyth Dry Dock Co., and as it is capable of accommodating almost the largest cargo boats afloat, it is an acquisition particularly needed in view of the growing tendency to adopt bigger dimensions in steamers.

THE WEAR.

(From our own Correspondent.)

Shipbuilding.—Many shipbuilding firms on the Wear commenced the work of the year with considerable energy, in anticipation probably of an early ending of the engineering difficulty, which at this moment is the only obstacle in the way of brisk trade. There is not the least reason to doubt that orders are plentiful—so much so indeed, that even the firms that are ordinarily regarded as but of small account are fully supplied as well as those that are usually more conspicuously in evidence.

The firms which took the lead in making up the aggregate output of last year are likely to repeat the performance in the year now entered upon. The signs are in favour of such a presumption at all events, for the firms indicated have the most work in hand, and appear to be getting through their contract engagements with the greatest despatch. Messrs. J. L. Thompson & Sons are said to have booked an order of more than ordinary importance for a large steamer to be employed in a special trade. They have several vessels of large size on the stocks, and it is understood that others are in preparation.

Messrs. Blumer & Co. have the distinction of launching the first vessel on the Wear this year, and the vessel put off the stocks is, we note, registered at a French port. The firm have orders sufficient to keep them actively engaged up to a late period of next year. At Messrs. Austin & Sons' establishment there is also a good deal of new and old work in hand, the latter predominating. Messrs. Bartram & Sons have two vessels ready for launching, both of which are kept on the stocks because of the machinery not being ready. It is understood that the firm have other work to go on with as soon as the two vessels referred to are got out of the way.

The Sunderland Shipbuilding Co. have an order for an Australian liner, and part of the material for same has already been delivered. The firm have some other orders, and will be kept fully employed during the whole of this year.

Messrs. Short Bros. are plentifully supplied with orders, as many as possible of which are in course of execution. Among these may be mentioned a large vessel for the Nitrate Co., London. The firm have two extensive repair contracts in hand, and other vessels are expected at the yard for thorough overhaul. Night work is being resorted to in the frame turning department and throughout the establishment great briskness is apparent.

Messrs. Priestman & Co. have received an order for a second self-trimming steamer from Messrs. Reed, McNair & Co., of Glasgow, and have several other orders on their books. The outlook for the year at this establishment is therefore satisfactory. Messrs. Pickersgill are also well provided for the year, having no fewer than four contracts to proceed with. Like Messrs. Osborne & Graham, of South Hylton, the firm did very little during the year just passed; but it is to be hoped that in both cases better results will be shown at the end of the year now entered upon.

Messrs. Doxford have received an order for another torpedo destroyer from the Admiralty, and the firm are thus permitted to uphold the character of the Wear as a source of supply for Government requirements. The firm have a good many orders for "turret" steamers, and all departments of their extensive works must necessarily become very busy as soon as the engineers' strike is ended. Messrs. R. Thompson & Sons are preparing to launch their first vessel for the year, and it is understood that the berth will not long remain unoccupied. At Sir James Laing's yard, a vessel intended for the South Atlantic trade will soon be put off the stocks, and it is expected that a Japanese boat will speedily follow.

Engineering.—The operative engineers on strike in the Wear district have had a good deal to put up with lately, for, in addition to the incapacity exhibited by the London officials of their union—which incapacity, by the way, has led them into perhaps the worst predicament a body of men ever found themselves in—they have been very badly treated by one of the local secretaries, who deserted them in the hour of need, taking with him a considerable sum which had been sent to him for distribution as strike pay. So far, the men have made no outcry either against London or local officials, and one can only wonder at their patience under provocation of no common kind. However mistaken their views may be in other matters, the Sunderland engineers are acting very creditably in refraining from complaints under the circumstances mentioned, and we cannot but hope that they soon will be peacefully and prosperously at work again. The best thing they could do now would be to dissociate themselves from the existing union—or what remains of it—and form an independent one, on a broader basis and safer lines. Whatever may be done in Sunderland, it is to be hoped that the provincial engineers generally will never again submit themselves to the leadership of those unwise fanatics who dictate their measures from London, and who have already wrought such incalculable mischief.

At each of the marine engine works of the Wear, strike hands have offered their services since the holidays, and scarcely a day passes but additions are being made to the aggregate number employed.

The s.s. *Regina*, belonging to a local firm, is to have her quadruple engines—put in six years ago—converted to triple, and will also have new boilers fitted. The work will be done by Messrs. W. Allan & Co., who originally engined the vessel.

It is in contemplation to construct a new graving dock suitable for the accommodation of very large vessels, in contiguity to the existing graving dock belonging to the Wear Commissioners. The proposed dock is to be 700 ft. long and of proportionate dimensions in other respects; while the equipment of pumping and other machinery will be in every respect up to date. It is understood that the position of the dock is already marked out, and that excavating operations will be commenced very shortly. The erection of new coal staithes at the west side of the Hudson dock is being energetically proceeded with, and these additional loading accessories will probably be ready for use by the end of the year. When these staithes are completed, vessels can be placed alongside of a much larger draught than any which could hitherto have been dealt with.

The Hartlepools.—Messrs. Gray & Co. have been among the first on the North-East to put a vessel off the stocks and thus make their initial contribution to the year's output. The three yards belonging to the firm are well supplied with work, as also are the yards of Messrs. Furness, Withey & Co., and Messrs. Irvine & Co. At the local engine works, matters are very little altered from the state of affairs that existed a month ago, the only perceptible change being in the direction of fuller production. The Hartlepool Steel Works are kept actively going, a good many orders for ship and boiler plates having been booked before the close of last year. There is now a marked falling off in the imports of timber, and business at the docks has consequently assumed a tone of dulness which is scarcely likely to undergo any alteration till the early summer. Coal shipments are being kept up to the average.

Stockton.—Shipbuilding at this centre promises to be very brisk as soon as the removal of the engineering obstruction allows builders to give a free rein to their efforts. In the engineering establishments work is progressing as satisfactorily as could be expected, and at Messrs. Blair & Co.'s sheerlegs there are vessels receiving their machinery and others awaiting "turns." Plate rolling mills are fully employed, and prices of both ship and boiler plate remain firm. Bridge works are fairly busy, and at the boiler works of Messrs. Suthron & Co. and other establishments of a similar kind, orders for special types of boilers have been recently booked.

Middlesbrough.—The shipbuilding yards of Sir Raylton Dixon & Co. and Messrs. Craggs & Sons both show signs of coming briskness in the form of building berths being made ready for the reception of keels, and heavy deliveries of materials are being received. Engine works, boiler works, bridge works, and foundries show scarcely any change since last month, and in the local steel and iron works a condition of general activity is to be noted. At the docks business is less active.

Consett.—Large orders for shipbuilding material have been secured by the agents of the Consett Co., and the plate mills and angle rolling departments are consequently kept in active operation.

THE MERSEY.

(From our own Correspondent.)

At last the great struggle in the engineering trades is at an end. The first indication of surrender on the part of the workmen was the withdrawal of the forty-eight hours demand, and this has been followed by an acceptance of practically the conference terms, with, however, a provision that the Federation's explanatory notes and assurances on certain points considered of special importance from a trade union point of view shall be included as part of the settlement terms. Since the collapse of the conference at the commencement of the past month there has been a further very important extension of the employers' combination, and, throughout Lancashire, quite fifty additional firms have joined in the lock-out, the total number of engineering establishments throughout the various federated districts of the kingdom who had joined in the lock-out when the final settlement was come to being not less than seven hundred. The most important accessions in Lancashire have been the large boiler-making and general engineering concerns in the Hyde and Dukinfield districts, whilst in the neighbourhood of Manchester such important firms as Messrs. Galloways, Limited, Gresham & Craven, Hamilton, Wood, & Co., Harrison Engine Co., and in the Liverpool district Messrs. Fawcett, Preston & Co., the well-known marine engineers, have all thrown in their lot with the Federation. This steady extension of the lock-out has no doubt largely influenced the official representatives of the workmen in abandoning a struggle which had become altogether hopeless. With the re-starting of engineering works there is in most cases abundance of orders to keep them engaged well over the year. A considerable portion of this work is in connection with marine engineering, both in the tool-making and shipbuilding departments. At the same time some important orders have been lost owing to firms being unable to bind themselves to specified delivery; whilst Messrs. Laird Bros. are reported to have refused important orders in connection with torpedo-boat construction. With regard to firms who have not been affected by the lock out, these have as a rule had plenty of work to do during the dispute, many of them on orders that should have gone to federated firms, and others, chiefly, of course, non-unionist shops, on work given to them by federated concerns.

It is interesting to note that as soon as the employers had published their explanatory notes accompanying the terms of settlement agreed to at the conference, the Manchester district secretaries of the Amalgamated Society of Engineers wrote to the local employers' branch, stating that if the employers really did not wish to introduce new or untried conditions, or to reduce the wages of skilled workmen, they saw no reason why they could not meet the local representatives of the workmen, in order to come to a settlement so far as Manchester was concerned. This attempt to bring about a local settlement was in accordance with instructions from the central executive, who on the collapse of the conference advised their districts to endeavour to effect independent settlements, if possible, with the federated employers. Of course, this policy—which was distasteful to the smaller allied unions—was one in which the employers could not

join, and the local branch in the Manchester district replied to the workmen's secretary that the proposal could not be entertained; any settlement of the dispute must be of a general character, agreed to by the federation as a whole, and also by all the allied unions.

The course of action pursued by Mr. Barnes, the general secretary of the Amalgamated Society of Engineers, during the dispute, has given anything but satisfaction to many of the members of the organization. At any rate, we understand that the rumour that when Mr. Barnes seeks re-election to the secretaryship a few months hence, he will be opposed by Mr. John Anderson, his predecessor, who has consented to be nominated for the post, is well founded. It may be added that Mr. Anderson, who resigned the office a year ago, was district secretary to the Amalgamated Society of Engineers in Manchester prior to his going to the general office, and in his candidature for the secretaryship he was well supported by Lancashire members.

During the month there have been several satisfactory full-power, coal consumption trials of torpedo destroyers, built by Messrs. Laird Bros. In six runs on the measured mile on the Clyde H.M.S. *Wolf* attained a mean speed of 30·31 knots, and in the three hours' continuous steaming 30·11 knots. This trial was made during boisterous weather, and in the fifth mile a fierce squall of wind and rain struck the vessel, causing her to heel considerably, and no doubt diminish her speed. The trial was in every way successful. The *Seal* has also, during the month, passed through a successful trial, and realised 30·04 knots on the measured mile, and 30·02 continuous steaming. The *Locust*, in her official full-power, coal consumption trial on the Clyde, attained a mean speed on the six runs of 30·26 knots, with 369 revolutions, and the speed for the three hours' continuous running was 30·16 knots.

Good progress has been made by the firm with the first-class battleship *Glory*, 12,900 tons, and the destroyer *Orwell*, both for H.M. Navy, and also with a fast paddle steamer for the South-Eastern Railway Co.'s service between Folkestone and Boulogne.

The Ardwick Engineering Co., Bennett Street, Ardwick, Manchester, are introducing an improved form of compound condensing yacht engine. In this engine, the condenser forming the base of the back columns is cast with them, the cylinder being supported in front by wrought-iron columns. All the forgings are of mild steel, and the whole of the parts are adjustable and easy of access. In designing this engine efficiency in working and strength in construction have been specially studied, whilst attention has also been devoted to secure economy in space occupied, which is such an important desideratum in vessels of any kind. The firm have recently supplied four compound condenser, with 5 in. high and 8½ in. low pressure cylinders, and 6 in. stroke for marine requirements, and also two triple-expansion engines, with 2½ in. high, 3½ in. intermediate, and 5 in. low pressure cylinders, and 5 in. stroke, to Colonial users. With regard to the "Compact" compound launch engine, of which we gave an illustrated notice in a recent issue, it may be mentioned that one of these has been calculated to run eight thousand miles in six months, without the attention of a skilled mechanic. The company have also introduced a new small power gas engine, in which the usual rotary motion has been replaced by a tappet arrangement, which renders the valves more easy of access and repair, and prevents them from "gauling."

In the iron trade the position has been unsettled during the last month, with only a slow business stirring. Towards the close, however, the prospect of an early settlement of the engineers' dispute has given a stronger tone to prices, especially for forward delivery, and there is considerably less underselling on the part of merchants, who have in many cases been compelled to cover at maker's quoted rates. Local and district brands of pig-iron remain at late rates with an advance asked for Lincolnshire, although not officially announced, and in some cases a fair enquiry is reported. Delivered Manchester Lancashire is quoted 45s. 6d. for forge to 48s. 6d. for foundry, less 2½; Lincolnshire 43s. to 43s. 6d. for forge to 45s. 6d. to 46s. for foundry, and Derbyshire foundry 47s. 6d. and 48s. 6d. up to 50s. net cash, delivered Manchester. Outside brands offering here have shown a gradual upward movement, and Middlesbrough makers are not quoting under 49s. 7d. to 50s. 3d. net cash for named foundry brands, delivered by rail Manchester, with open brands offered about 3d. to 6d. less. Scotch iron is now generally quoted 47s. 6d. to 48s. for Glengarnock, and 47s. 9d. to 48s. for Eglinton, net prompt cash, delivered Lancashire ports, with 2s. 3d. above these figures quoted for delivery at the Manchester docks. American pig-iron has been in moderate request at low prices, averaging about 45s. 6d. net cash, delivered Manchester docks.

A more active tone is reported as regards finished iron, although the enquiries stirring are chiefly for forward delivery, and prices for bars are stronger. Lancashire makers quote £5 15s. to £5 17s. 6d., and for North Staffordshire, although £5 15s. has been taken during the month, makers, as a rule, are not quoting under £5 17s. 6d. to £6 per ton, delivered in this district. Sheets remain much as last reported, and average £6 15s. to £7 per ton. For hoops there is only a very limited demand, but association list rates remain at £6 10s. for random to £6 15s. for special cut lengths, delivered Manchester district, and 2s. 6d. less for shipment.

The steel trade has shown some irregularity, especially as regards manufactured material. Ordinary foundry hematites have advanced to about 57s. as the minimum, with 2s. more asked for some qualities less 2½. Local billets remain at £4 5s. to £4 6s. 3d., net cash, delivered here, but steel bars have been sold as low as £5 15s., although £6 to £6 2s. 6d. are the general quotations. Common steel plates average about £5 15s., with boiler-making qualities quoted £6 5s. delivered in this district.

Only a small demand has been coming forward in the metal market, although it is expected that with a settlement of the engineers' strike, which has necessarily caused a considerable diminution in the demand for manufactured metal goods for engineering requirements, there will be a marked increase in the volume of business doing. List rates remain as last given, solid-drawn brass boiler tubes, delivered Manchester district, averaging 7¼d.; condenser tubes, 8¾d.; copper tubes, 8¾d.; brazed copper gas and steam tubes, 8½d.; brazed brass tubes, 7¾d.; rolled brass, 5¾d.; brass wire, 6d. to 6½d.; and copper wire, 7d. per lb.

The timber trade presents no new feature. There has been a fair demand on the leading lines, but with ample stocks, prices are scarcely firm.

No improvement has been noticeable in the coal trade of this district, and pits in many cases are scarcely able to keep on full time. House-fire qualities are meeting with only a very slow demand especially, considering the time of the year, the exceptional mildness of the season, of course, accounting for this slackness—and where pits are maintaining their full output, supplies are ample for requirements, whilst stocks remain untouched. Prices are, however, unaltered from late list rates, averaging 10s. 6d. to 11s. for best Wigan Arley; 8s. 6d. to 9s. for Pemberton four-foot and seconds Arley; and 7s. to 7s. 6d. for common house coal at the pitmouth; unless a spell of severe weather sets in, creating a pressure of demand upon house-fire qualities, it is not expected that any advance on the above rates will be obtainable during the present winter. Steam and forge coals are in moderate request, with prices about steady at 6s. 6d. per ton as the average for ordinary qualities, at the pitmouth. Engine classes of fuel are maintaining late rates, common slack averaging 3s. to 3s. 6d.; medium, 3s. 9d. to 4s. 3d.; and better sorts 4s. 6d. to 5s. per ton at the pitmouth, but in some districts there is keen competition with low priced supplies from Yorkshire and Derbyshire

The shipping trade has been fairly active, but this also is suffering from outside competition. The average prices for Lancashire steam coal remain, however, at about 8s. to 8s. 3d. per ton, delivered at the ports on the Mersey.

BELFAST.

(From our own Correspondent.)

WE have entered upon another year, and still the war between capital and labour continues. Although reports are to hand of capitulation so far as the A.S.E. are concerned, namely, that they have withdrawn their demand for a 48-hours' week in London, and this, it is hoped, means clearing the way for a permanent settlement of this unfortunate and prolonged dispute. Still, it is rumoured, that the men in various large centres are not disposed to accept the masters' terms as to workshop management. However, a meeting of the Federation has been summoned to consider the withdrawal of the 48 hours question, and it is fully expected that the masters will issue a manifesto as to the terms on which the works will be re-opened, and there is no doubt whatever, but that the majority of the men will be only too glad to resume work With regard to the men being reinstated in their old jobs however, it will be found that in most of the Belfast engineering works that many machine men and turners will

not obtain their old machines, as their places have been filled in a very considerable number of cases. Engine fitters are different, as they are urgently required in all the shops. It is earnestly hoped that some really permanent arrangement for the mutual benefit of both masters and men may be come to, and that both may agree to work in harmony, so that the year just begun may be a record one so far as the engineering and shipbuilding industries of this country are concerned.

On the 24th December, 1897, Messrs. Harland & Wolff, Limited, of this city, launched the large twin-screw steamer *Monmouth* making the eleventh vessel launched by them last year, and bringing their tonnage output for the twelve months up to 84,240 tons, which exceeds the previous year's record. The new vessel, which has been built to the order of the African Steamship Co. for the Montreal trade, is 490 ft. long by 56 ft. beam, and her gross tonnage is about 7,950. She will be lighted throughout with electric light, and will have every facility for rapid loading and discharging of cargo. A shade-deck will be fitted for cattle. The machinery for propelling the vessel consists of two sets of triple-expansion engines, which have also been constructed by Messrs. Harland & Wolff. This firm are at present extremely busy, and have a large number of orders on hand, one of the most recent of these being a 12,000-ton steamer for the Holland-American Line, of Rotterdam, which will be a fast passenger and cargo steamer. The *Persia*, which was built by Messrs. Harland & Wolff about five years ago and lately sold by the Hamburg-American Co., of Hamburg, to the Atlantic Transport Co., is again in her builders' hands undergoing extensive alterations, and will shortly take up her station under the new name of *Minnewaska*.

Messrs. Workman, Clark & Co., Limited, are also said to have plenty of orders on hand, but owing to the engineers' dispute, the machinery is so far behind the ships that the work cannot be proceeded with.

Another addition to the tonnage of the port is the s.s. *Comic*, belonging to the Belfast Steamship Co. This vessel was built by Messrs. Barclay, Curle & Co., Limited, of Glasgow, and left that port for Liverpool end of last month on her trial trip. She encountered very stormy weather, but, notwithstanding, reached Liverpool safely, and there is no doubt she will form a handsome addition to this already popular fleet of cross-Channel steamers.

On the 4th of this month the new steam collier *Empress*, owned by a Belfast firm, ran her trial trip in Belfast Lough. The hull of this vessel was built by Messrs. John Fullerton & Co., Paisley, but she was engined by Messrs. Mac Coll & Co., Limited, of this town. Her dimensions are—Length, 165 ft., breadth, 26 ft., and depth, 12 ft. 3 in., and she will carry about 530 tons coal. Her engines are high-pressure compound of 600 I.H.P., with 125 lbs. pressure.

The s.s. *Ardendearg*, owned by Messrs. Clark & Service, Glasgow, is at present undergoing an extensive repair to the hull, which was badly damaged under the engine seat by the vessel going ashore recently on the rocks near Land's End. These are being carried out by Messrs. Workman, Clark & Co., Limited.

The Larne and Stranraer paddle steamer *Princess May* is also undergoing repairs at present.

NORTH-WEST OF ENGLAND

(From our own Correspondent.)

Barrow.—Activity in the shipbuilding trade of this district has been checked of late by reason of the engineers' dispute, and the stoppage of work in hand because other departments have not been able to proceed with their work to as full an extent as would otherwise have been possible. Short time has been commenced at the works of Messrs. Vickers, Son & Co., and had the dispute continued much longer it is certain this short time would have given way to a stoppage altogether. As it is, the work in hand is very much out of balance, and even when the engineers make a new start, it will be found that delays must naturally occur in the shipbuilding department because of engineering work in arrear. One thing seems certain, and that is that when the engineers do recommence work it will be found essential, as far as possible, to put on double shifts. The workshops are now crowded with innumerable castings ready for the tools of the engineers, and ships are ready for launching whose engines have not yet been started on. It is clear that, although none of the shipbuilding departments have been directly concerned in the engineers' dispute, they will be indirectly affected in exact ratio to the length of time it has taken to settle this great difficulty. However, it is generally felt that the greatest industrial war we have ever known will not only teach a very great lesson to all concerned, but will lead to such mutual arrangements between masters and men as will make another crisis of the sort impossible. The federation of masters has proved the great power capital has at command. The sensible part of the workmen will not be slow to see the necessity of regulating their demands to reasonable and common-sense proposals. The strike has not only proved a very serious check to the business in hand, but has resulted in stopping the inflow of new orders, many of which have unfortunately gone out of the country, and new business connections have thus been formed which may never be dissolved. Now that a settlement has been come to, it is quite expected that important accessions to business will result. This will certainly be the case at Barrow, as the dispute arose just at the time when Messrs. Vickers, Son & Co. purchased the works of the Naval Construction and Armaments Co. Their object is to develop the great shipbuilding enterprise of Barrow, especially in the direction of warship construction, and although no new orders for war vessels have been placed at Barrow in the meantime it is known that progress has been made with the preliminaries which are likely to lead to big business in this direction in the immediate future. Beyond this, Messrs. Vickers, Sons & Maxim contemplate speculative warship building, utilising their own make of armour plates, and their own type of guns. Just when this proposal assumed concrete shape, the difficulty with the engineers put a check to it; that check, however, was only one of a temporary character, and opportunity has since been given for the formulation of plans which it is possible will be realised at an early date. What is certain is this, that the tonnage and H.P., built at Barrow in the past, will be largely increased in the future. During the month, H.M.S. *Niobe* has been practically completed, with the exception of her engine-room. There is about a month's work here, so that her trials may be expected in March or April. The torpedo-boat destroyer *Otter* has obtained her 30-knot speed in her trials on the Clyde, and her sister ships, the *Bittern*, *Leopard* and *Avon*, are ready to follow her example. The *Duke of Cornwall*, the new Fleetwood and Belfast steamer, is ready for launching. Much progress has been made with the construction of the *Amphitrite*—the telegraph cable steamer, and the two 7,000-ton Clan Liners. In fact, the work in the shipbuilding departments, locally, is too far ahead. It is hoped the engineers working double shifts will soon rectify the balance, and the inflow of new orders so long checked will soon be appreciable.

Shipbuilding Material.—Makers of all classes of shipbuilding material have remained very busy throughout the past month, and have a considerable number of orders on hand for forward delivery. The mills have been uninterruptedly busy for some time, and are likely to remain so, even on present orders, but trade is improving on every hand, and shipbuilders are beginning to specify for big deliveries in the early future. The plate mills are busy on large orders as well for light as for heavy plates, for ship construction, as well as for boilers. Sections are in full enquiry, and heavy steel castings for marine engineering work and ship construction are being very largely enquired for. There is a better outlook in this trade than for some time past.

The Hematite Trade.—A marked improvement has set in in the hematite pig-iron trade, The demand has increased in volume and makers have booked themselves well forward. Orders are coming to hand more freely because of the outlook of a fuller trade when the engineers get back to work at the early date in prospect. Smelters have 41 furnaces in blast, as compared with 36 in the corresponding period of last year. The value of Bessemer sorts is steady at 48s. 6d. to 50s. 6d. per ton, and warrant iron is quoted at 49s. 3d. net. cash sellers, 49s. 2½d. buyers. Stocks of iron have been slightly increased since the beginning of the year owing to the disposition of speculators to increase their holdings of metal with a view of benefitting by the prospective improvement in the trade.

Shipping.—The shipping trade has commenced well at West Coast ports this year. So far 24,653 tons of pig iron and 34,909 tons of steel have been exported this year, as compared with 14,196 tons of pig iron and 18,720 tons of steel in the corresponding period of last year, showing an increase of 10,457 tons of pig iron and 16,189 tons of steel. Prospects of an active year's shipping trade are already evidenced.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

St. Mary.—On December 18th Messrs. Wood, Skinner & Co. launched at Bill Quay-on-Tyne, to the order of the St. Hilda Steam Fishing Co., Limited, of Hartlepool, a steel and iron screw trawler of the following dimensions, viz.:—Length, 100 ft.; breadth, 19 ft.; depth, moulded, 10 ft. She will be fitted with a set of compound surface-condensing engines by the North-Eastern Marine Engineering Co., Limited, of Wallsend. The machinery is of the latest type, the cylinders being 15 in. and 28 in. diameter respectively, with a stroke of 20 in., steam being supplied by a large steel multitubular boiler working at 100 lbs. pressure. As the vessel was leaving the ways she was named *St. Mary* by Miss Glass, of Wingate.

Elswick.—On December 20th Messrs. Wood, Skinner & Co., at Bill Quay-on-Tyne, successfully launched from their shipbuilding yard a new steel screw coasting steamer which has been built to the order of Messrs. L. S. Carr & Co., of Baltic Chambers, Quayside, Newcastle. The principal dimensions of the vessel are as follows, viz.:—Length, 112 ft.; breadth, 20 ft.; depth, moulded, 9 ft. 8 in. She is rigged as a fore and aft schooner, and is specially designed for carrying cargoes of a heavy character, being fitted with all the latest improvements and appliances for facilitating rapid loading and discharging. The captain's and officers' accommodation is provided in the bridge amidships, the crew being berthed in the topgallant forecastle. The vessel will be fitted by the North-Eastern Marine Engineering Co., Limited, of Wallsend, with a set of compound surface-condensing engines, having cylinders 15 in. and 28 in. diameter respectively, with a stroke of 20 in., steam being supplied by a large steel multitubular boiler working at 100 lbs. pressure. Both the ship and engines have been built under Lloyd's special survey for the 100 A-1 classification. As the vessel was leaving the ways she was named *Elswick* by Mrs. Percy Robson, of Whitley, Northumberland.

Cyclops.—On December 21st there was launched at South Shields a steel steam tug of about 177 tons, named the *Cyclops*.

Gambia.—On Thursday, December 23rd, Sir Raylton, Dixon & Co., Limited, launched from their Cleveland Dockyards, Middlesbrough, a steel screw steamer built to the order of Messrs. Elder, Dempster & Co., of Liverpool. Her principal dimensions are:—Length, 320 ft.; beam, extreme, 44 ft.; depth, moulded, 26 ft. She is built to Lloyd's highest class, spar-deck rule, and has a deadweight carrying capacity of about 4,550 tons on a light draught of water. Triple-expansion engines will be fitted by Messrs. T. Richardson & Sons, Limited, of Hartlepool, having cylinders 23 in., 36 in., 59 in. by 42 in. stroke. On leaving the ways she was named *Gambia*.

Paris.—On December 23rd Messrs. Wood, Skinner & Co. launched at Bill Quay-on-Tyne, a very finely modelled steel screw steamer, built to the order of Messrs. Frank C. Strick & Co., Limited, of London. The vessel is intended for the coal trade with the Continent, and will attain a speed of 11½ knots per hour fully loaded. Her principal dimensions are as follows, viz.:—Length, 230 ft.; breadth, 32 ft. depth, moulded, 16 ft. 6 in. The ship is of the raised quarter-deck type, with accommodation for captain and officers in bridge, amidships, and for the engineers in side houses on raised quarter-deck, while the crew are berthed in the forecastle. The vessel is specially designed with extra large self-trimming hatches, and will be fitted with all the latest improvements and appliances considered requisite in the equipment of a vessel of this description, with a view to facilitating the rapid loading and discharging of cargo. Her engines, constructed by the North-Eastern Marine Engineering Co., Limited, are of the improved triple-expansion type, with cylinders 21 in., 34 in., and 56 in. diameter respectively, having a stroke of 36 in.; steam being supplied by a large steel boiler working at 160 lbs. pressure per square inch. The ship will be registered in the highest class at Lloyd's, under whose special survey both the hull and machinery have been constructed. The christening ceremony was performed by Miss Jessie A. Skinner, of South Shields, who named the steamer *Paris*.

Maygrove.—On December 23rd Messrs. Short Brothers launched from their works at Pallion, Sunderland, a handsomely-modelled steel screw steamer, built to the order of the Maygrove Steamship Co., Limited, of London, of which Messrs. Tweedy, Richardson & Co. are the managing owners. The vessel is built of steel to the highest class in Lloyd's Registry, under special survey, and is constructed on the improved spar-deck principle, with single deck laid, having open beams on main deck, on which a deck can be laid at any time to suit the trade in which she may be engaged. The framing, being on the improved deep-frame principle, leaves the lower holds clear of obstruction. The holds are four in number, with six powerful steam winches, and a very large donkey boiler. Steam steering gear is fitted at the after-end of the engine platform, with controlling rods from flying bridge. The bottom is of cellular construction, divided into six compartments for water ballast, the after peak being also fitted up as a trimming tank. Every attention has been given to the arrangements of the vessel for the quick loading and discharging of cargoes, and the appliances are of the latest pattern. On leaving the ways the vessel was named *Maygrove* by Miss Tweedy, of London. The vessel is fitted with triple-expansion engines by John Dickinson & Sons, Limited, of Sunderland, having cylinders 23 in., 38 in., and 62 in. diameter, with a stroke of 42 in., steam being supplied by two large steel boilers.

Edna.—On December 27th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, a sailing keel of the following dimensions, viz.:—Length, 61 ft. 6 in.; beam, extreme, 15 ft. 6 in.; depth amidships, 7 ft. 9 in.; carrying capacity, 130 tons. The vessel is one of three built to the order of Mr. W. T. Marshall, of Hull. She was christened the *Edna* by Miss Marshall, daughter of the owner.

Lakoja.—On December 31st there was launched at Newcastle-on-Tyne a steel steamer of about 3,250 tons, named the *Lakoja*. She is owned by Messrs. Elder, Dempster & Co.

Stella.—On January 6th there was launched, at South Shields, a steel steamer, of about 120 tons gross, named the *Stella*.

Emanuel.—On Saturday, January 8th, Messrs. William Gray & Co., Limited, launched a fine steel screw steamer of the following dimensions, viz.:—Length, over all, 275 ft.; breadth, 38 ft. 6 in.; depth, 19 ft. 8 in. She has been built to the order of the Rederiaktiebolaget Helsingborg (Mr. N. C. Corfitsen, manager), and will take Lloyd's highest class. The deck erections consist of a bridge deck and topgallant forecastle. A handsome saloon, state-room, captain's room, &c., will be fitted up in a large deckhouse on the bridge. The officers and engineers will also be accommodated in houses on top of bridge, and the crew forward. The sides of the vessel are built with deep frames, a cellular double-bottom is fitted, and large ballast tank in the after peak. Five steam winches, patent donkey boiler, steam steering gear amidships, hand screw steering gear in house aft, direct steam windlass, schooner-rig boats on beams overhead, and all improved appliances for working the steamer will be provided. The engines are of the triple-expansion type, working on three cranks, and are from the Central Marine Engine Works of Messrs. William Gray & Co., Limited, the cylinders being 19 in., 30½ in., and 51 in. diameter, with a 36-in. piston stroke, and a large steel boiler to work at a pressure of 160 lbs. per square inch. The steamer has been superintended during construction by Captain Johansson on behalf of the owners, and the ceremony of naming her *Emanuel* was gracefully performed by Miss Catherine Baines, of Bradgate, West Hartlepool.

Stilbe.—On January 8th a screw steamer was launched by Messrs. Blumer & Co., at Sunderland, to the order of Mr. A. C. Le Quellec, of Bordeaux. The vessel has been built on the spar-deck rule with deep framing, to take the highest class at Lloyd's, and is of the following dimensions:—Length, b.p. 330 ft.; breadth, 46 ft.; depth, moulded to spar deck, 27 ft. 4 in. She has been specially designed for the wine trade. The engines and boilers are being built by Messrs. John Dickinson & Sons. This vessel, which was named *Stilbe*, has been built under the supervision of Messrs. Wm. Esplen & Sons.

Derwent.—On January 10th Messrs. Cochrane & Cooper launched at Beverley an iron steam ketch, of about 188 tons gross, named the *Derwent*. She is owned by the East Coast Steam Trawling Co., Limited.

Lodes.—On January 10th Messrs. R. Williamson & Son, Workington, launched from their shipbuilding yard the steel screw steamer *Lodes*, of 396 tons gross and 123 tons net, with a deadweight capacity of about 460 tons. She is built to the order of Messrs. Casebourne, Fowler, & Co., Middlesbrough,

and is fitted with compound engines 19 in. and 38 in., with a stroke of 27 in., by Messrs. Ross & Duncan, Glasgow.

Reynolds.—On January 20th this vessel was successfully launched by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, and is built to the order of Messrs. The Bolton Steam Shipping Co., Limited, of London, and is the seventh vessel built by this firm for these owners. She is built to Lloyd's highest class on an improved partial awning-deck arrangement, and the leading dimensions are: 325 ft. b.p., 44 ft. 6 in., and 22 ft. 2 in. moulded. The accommodation for the saloon, captain, officers, spare berth, etc., is placed in a large house amidships, and on top of this is placed the chart and steering house; the engineers and petty officers, messroom, galley, etc., are placed in houses at the after end of the engine casings, while the crew and firemen are berthed forward. The vessel is built on the web-frame principle, with longitudinal intercostal stringers, and has six transverse watertight bulkheads, also iron longitudinal bulkheads; cellular double bottom, fore-and-aft rig, five steam winches, multitubular donkey boiler, patent steam windlass, steam steering gear placed in the engine-room with controlling gear to the captain's bridge, screw gear aft, four boats, and she is fitted with every appliance for the rapid handling of cargo and the economical working of the vessel. The gross tonnage will be about 3,200, and the deadweight carrying capacity about 5,100. The machinery is built by Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, the sizes of the cylinders being 24 in., 36 in., 64 in., by 42 in. stroke, with two boilers working at 160 lbs. pressure. There was a numerous company present at the launch, after which an adjournment was made to the firm's luncheon room, where the usual toasts were duly honoured.

Minoco.—On Saturday, January 22nd, there was launched from the yard of the Tyne Iron Shipbuilding Co., Limited, of Willington Quay-on-Tyne, a steel screw steamer, built to the order of the Mineral Oils Corporation, Limited, of London, and of the following dimensions, viz.:—Length, 200 ft.; breadth, 32 ft.; depth, 15 ft. 3 in.; and to class 100 A1 at Lloyd's. The vessel is arranged for carrying oil in bulk, and is also fitted with all modern improvements for her intended work. The engines, which are to be supplied by Messrs. The Wallsend Slipway and Engineering Co., Limited, are of the triple-expansion type, and are of ample power, so as to give the vessel a high rate of speed. On leaving the ways the vessel was named the *Minoco* by Mrs. Brunton, of Tynemouth.

Earnham.—On Saturday, January 22nd, there was launched from the Southwick yard of Messrs. Robert Thompson & Sons, a steel single-deck steamer, built to the order of The Thompson Steamshipping Co., Limited, Sunderland. Her dimensions are:—Length, b.p., 325 ft.; breadth, 48 ft. 6 in.; depth, moulded, 24 ft.; and is built on the deep-frame principle, class 100 A1 at Lloyd's, and is designed to carry a large deadweight on 20ft. 6 in. draught. The vessel is fitted with poop aft, long bridge amidships, on top of which are deck-houses for the accommodation of captain, officers, and engineers, leaving a clear cargo space in bridge and poop, topgallant forecastle for crew and petty officers, ample water ballast in cellular bottom, and fore-and-aft peaks of about 1,000 tons. The bottom is divided into six compartments for trimming purposes, five large hatchways with steam winch and double derricks to each hatch for rapid loading and discharging, and extra large multitubular donkey boiler. The engines are by Messrs. Geo. Clark, Limited, having cylinders 24 in., 39 in., and 64 in. by 42 in. stroke, with extra large boilers of 180 lbs. H.P. Both ship and engines have been designed with all the most modern improvements for a first-class cargo steamer. As the vessel left the ways she was gracefully christened *Earnham* by Miss Dulcie Thompson, daughter of the managing owner. Mr. V. T. Thompson.

Consols.—On January 22nd Messrs. Bartram & Sons launched at Sunderland, to the order of Messrs. Wm. Thomas & Co., of Liverpool, a large steel screw steamer of the following dimensions, viz.:—Length, 350 ft.; breadth, 46½ ft.; depth, 26 ft. 9 in. The engines will be fitted on board by Messrs. John Dickinson & Sons, Limited, the cylinders being 24 in., 39½ in., and 65 in. diameter, with 42-in. stroke. The vessel is of the spar-deck type, and has been built to take the highest class in Lloyd's Registry, and was named the *Consols*.

Umgeni.—On January 22nd a passenger screw steamer was launched by Sir James Laing, at Sunderland. The vessel is to Lloyd's highest class, and intended to trade between London and the Cape. She will carry about 38 first-class and 20 second-class passengers, and 3,200 tons of cargo. The dimensions are:—Length, between perpendiculars, 330 ft.; breadth, moulded, 41 ft.; depth, moulded, 24 ft. 5 in.; and she is built under the spar-deck rule. The engines have been designed and built by Messrs. George Clark, Limited, Southwick, and the cylinders are 25 in., 44½ in., and 68 in., by 45 in. stroke. The owners, Messrs. Bullard, King & Co., St. Mary Axe, London, and Natal, have been represented during the construction of the ship by Captain Harvey. As the ship left the ways she was christened *Umgeni* by Mrs. Edwin King, of London.

Hai Chi.—On January 24th Sir W. G. Armstrong, Whitworth & Co. launched, from their yard at Walker-on-Tyne, the Chinese cruiser *Hai Chi*. She has a length of 396 ft., a beam of 46 ft. 8 in., and a displacement of 4,300 tons. Her armament will consist of two 8-in. guns, 10 7-in. guns, 12 three-pounder guns, 10 Maxim guns, and five torpedo tubes, and she is to have a guaranteed speed of 24 knots

Beatrice.—On January 24th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, a steel towing lighter of the following dimensions, viz.:—Length, over all, 97 ft.; beam, moulded, 18 ft.; depth, moulded, 7 ft. 9 in., with a carrying capacity of 250 tons. She was christened *Beatrice* by Mrs. H. Marshall, and makes the seventh vessel built to the order of Messrs. H. Leetham & Sons, York.

Kitty, Lily, Plover, and Starling.—Earle's Shipbuilding and Engineering Co., Limited, have lately launched from their yard at Hull the four steam trawlers *Kitty*, *Lily*, *Plover*, and *Starling*, two being for the Fleetwood Steam Fishing Co., and two for the Pioneer Steam Fishing Co., Limited, of Grimsby. These are all sister ships, 105 ft. long, 21 ft. beam, and 12 ft. 6 in. depth of hold, and are built with extra scantlings over Lloyd's highest class to make them the better suited for the rough work of North Sea fishing. They will be fitted by the builders with triple compound engines of their special design for this class of vessel.

LAUNCHES.—Scotch.

Rotoite.—On December 8th a steel steamer of about 1,100 tons was launched at Dumbarton. She is owned by the Union Steamship Co., of New Zealand, and was named the *Rotoite*.

Rex and Regina.—On December 22nd Messrs. Carmichael, Maclean & Co. launched at Greenock two steel screw steamers, each of 280 tons gross, which they have built for Messrs. Mackie & Thomson, to the order of Messrs. R. Simpson & Co., Limited, Hull. The dimensions are:—Length, between perpendiculars, 130 ft.; breadth, 23 ft.; depth, 11 ft., moulded; to class 100A at Lloyd's; triple-expansion engines, to be supplied by Messrs. Bow, M'Lachlan & Co., Paisley, to the order of Messrs. Muir & Houston, Glasgow. These vessels have been specially built for carrying fish from the North Sea fleet to the London market. The *Rex* was gracefully christened by Miss Meiklejohn as she left the ways, and the *Regina* by Miss Netta Mackie. Amongst those present at the launches were Mr. Carmichael, Mr. McLean, Mr. Colin Houston, and Mr. Mackie, of Glasgow; and Mr. George H. Strong (consulting engineer), of Hull.

Arbela.—On December 23rd Messrs. Russell & Co., Port Glasgow, launched the steel screw spar-decked steamer *Arbela* to the order of Messrs. William Thomson & Co., St. John, New Brunswick. The dimensions are:—Length, 325 ft.; breadth, 48 ft.; depth, 25 ft.; of 5,000 tons deadweight carrying capacity. Messrs. Blackwood & Gordon, Port-Glasgow, will supply the machinery.

John Mutton.—On December 24th Messrs. Hall, Russell & Co. launched at Aberdeen a steel screw trawler of 160 tons gross register, built to the order of Bailie Brown. The vessel has engines of 320 I.H.P. As she left the ways the trawler was named the *John Mutton*.

Kasuga Maru.—On December 27th Messrs. R. Napier & Sons, Limited, Govan, launched the first of three screw steamers of about 3,300 tons each, which they are building for the Nippon Yusen Kaisha (Japan Mail Steamship Co.). These fine vessels have been designed to meet the requirements of the company's Australian service, and are built under special survey to Lloyd's three-deck class, and fitted in accordance with the Japanese Government's rules and British Board of Trade

requirements. The general dimensions of each are:—Length, 375 ft.; breadth, 44 ft.: depth, 27 ft. 8 in., with a topgallant forecastle, long bridge, full poop, and partial shade deck. She is constructed with a cellular double-bottom for water ballast; the upper decks and fittings are of teak, and the most modern appliances have been supplied for the efficient working of the ship and for the rapid handling of cargo. Luxurious accommodation has been provided amidships for first-class passengers, and as the steamers are intended to trade in tropical climates the dining saloon, social hall, and smoking-room have been placed on the bridge deck, with large and roomy state-rooms on the upper deck, furnished with the most recent improvements for the comfort of the passengers. The second-class accommodation, scarcely inferior to the first, is in the poop, and comfortable quarters for steerage passengers are provided in the 'tween decks. Mrs. George A. Agnew named the vessel the *Kasuga Maru*. The machinery has been constructed at the builders' Lancefield Engine Works.

Captain.—On December 27th there was launched at Aberdeen a steel steamer of about 143 tons. She is owned by T. Devin, jun., and was named the *Captain*.

Boveric.—On December 31st Messrs. Russell & Co, Port-Glasgow, launched a steel spar-decked screw steamer to the order of Messrs. Andrew Weir & Co., Glasgow. The dimensions are:—Length, 345 ft.; breadth, 49 ft. 9 in.; depth, 28 ft. 5 in. The steamer measures about 3,950 tons gross register, and will carry 6,250 tons deadweight. The ceremony of naming the steamer *Boveric* was performed by Mrs. Shotton, wife of Captain Shotton, who is expected to take command. The machinery will be supplied by Messrs. Rankin & Black more.

Nellie Bruce.—Oh January 6th the Dundee Shipbuilders' Co. launched from Panmure shipyard a steel screw steam trawler of the following dimensions: —Length, 112 ft.; breadth, 21 ft.; depth, 11 ft. 6 in., for the Crampin Steam Fishing Co., Limited, Grimsby. The vessel was christened *Nellie Bruce* as she left the ways by Mrs. Bruce, wife of Captain Bruce, Grimsby.

M. J. Craig.—On January 6th the Ailsa Shipbuilding Co., Troon, launched from their yard a fine steel screw-steamer, built for Messrs. Hugh Craig & Co., of Belfast, and designed by Mr. Joseph Lewis, consulting engineer, of that city. Her dimensions are:—Length, over all, 200 ft.; length between perpendiculars, 192 ft.; breadth, 29 ft. 6 in.; depth, moulded, 14 ft. 6 in.: and she will be capable of carrying 800 tons of cargo on a light draught. Her engines are being fitted by Messrs. Dunsmuir & Jackson, of Govan, and are of the compound surface-condensing type, the cylinders being 24 in. and 48 in. diameter, with a stroke of 36 in. She has self-trimming hatches, steam winches, steam windlass, and steam steering gear, and every modern convenience for the rapid loading and discharging of cargo and the safe navigation of the vessel. As she left the ways she was gracefully named the *M. J. Craig* by Mrs. Barbour, Dennistoun, Glasgow.

Uxbridge and Whitby.—On January 12th the Irvine Shipbuilding and Engineering Co., Limited, launched two screw steam trawlers of 160 tons gross each. The vessels are built of steel to Lloyd's highest class, under special survey. Their dimensions are 110 ft. by 21 ft. by 11 ft. 7 in. moulded, and they are being supplied by Messrs. Muir & Houston, Limited, Glasgow, with triple-expansion engines of about 250 I.H.P., having cylinders 10 in., 16 in., and 27 in. by 20 in. stroke, steam being supplied by a large steel boiler at 180 lbs. pressure. The vessels, built to the order of Messrs. Hagerup, Doughty & Co., Grimsby, were named *Uxbridge* and *Whitby*.

Bute 4.—On January 21st there was launched by Messrs. John Fullerton & Co., at Paisley, a steamer of about 200 tons, which has been built to the order of Messrs. Hill & Co., Glasgow, to meet the growing requirements of their carrying trade to the Firth ports—Bute, Cumbrae, and Arran. Engines of 250 I.H.P. are being supplied by Messrs. Cameron, Mills & Co., Glasgow. Miss Rodger, Largs, named the steamer *Bute 4*.

Ajax and Velox.—On January 22nd Messrs. Carmichael, Maclean & Co., shipbuilders, Greenock, launched from their shipbuilding yard two steel screw steamers, each of 280 tons gross, which they have built for Messrs. R. Simpson & Co., Limited, Hull. The dimensions are:—Length, between perpendiculars, 130 ft.; breadth, 23 ft.; depth, 11 ft., moulded; to class 100A at Lloyd's. Triple-expansion engines will be supplied by Messrs, Bow, M'Lachlan & Co., Paisley. These vessels, named *Ajax* and *Velox*, have been specially built for carrying fish from the North Sea fleet to the London market.

LAUNCH—IRISH.

Monmouth.—On December 23rd Messrs. Harland & Wolff launched at Belfast the large steel twin-screw steamer *Monmouth* from the south end of the Queen's Island. She has been built to the order of the African Steamship Co., for the Montreal trade, is 490 ft. long by 56 ft. beam, and her gross tonnage about 7,950. She will be lighted throughout with the electric light, and will have every facility for rapid loading and discharging of cargo. A shade deck will be fitted up for cattle. The machinery for propelling the vessel will consist of two sets of triple-expansion engines. The owners were represented at the launch by Mr. Herbert J. Ward, and the christening ceremony was gracefully performed by Mrs. Herbert Ward.

TRIAL TRIPS.

Aldershot.—On December 16th the new steamer *Aldershot*, owned by the Briton Steamship Co, Limited, London, made her official trip in the Tees Bay, which proved satisfactory, the engines working smoothly, and the vessel herself behaving in a very satisfactory manner, and, although fully loaded, a good rate of speed was obtained. The steamer, built by Messrs. Ropner & Sons, of Stockton-on-Tees, is fitted with the builders' patent trunk. Triple-expansion engines have been supplied by Messrs. Blair & Co., Limited, of Stockton.

Spartan Prince.—On December 22nd the trial trip of the *Spartan Prince*, the latest addition to the Prince Line, took place and was most successful, the steamer averaging on the measured mile 14·93 knots. After the trial she proceeded to New York to take her place on the line between that port and the Mediterranean. The dimensions of the vessel are:—367 ft. by 44 ft. by 25 ft. 7 in., with a carrying capacity of 5,000 tons. The steamer is fitted throughout, including the 'tween decks, with the electric light, and the latest improvements have been fitted to ensure the comfort of the large number of emigrants travelling by these steamers, in accordance with the recent stringent regulations issued by the Italian Government.

Tertia.—On December 23rd the new steamer *Tertia*, built by the Flensburg Shipbuilding Co., to the order of the Flensburg Steamship Co., of 1869, made her first trial trip. Her dimensions are:—236 ft. by 39 ft. 8 in. by 19 ft. 9½ in.; engines, 820 H.P.; speed 11 knots. The *Tertia* is the fifteenth steamer built for this Steamship Co. by the Flensburg Shipbuilding Co. She is specially constructed for the Baltic trade, and very well adapted for carrying a large deck cargo of timber.

Chantenay.—On December 24th the new steamer *Chantenay*, built to the order of the Société Général de Houilles and Agglomeres, of Paris, and Mr. L. Gueret, of Cardiff, went out on trial with satisfactory results. After adjusting compasses the vessel was taken over the measured mile, when a mean speed of 11½ knots was attained. The vessel was built by Messrs. Short Brothers, Sunderland, and is of the following dimensions:—Length, 255·4 ft.; breadth, 36·75 ft.; and depth moulded, 19 ft. 6 in., and has been specially designed with very large self-trimming hatches, to meet the requirements of the company. The engines have been supplied by Messrs. William Allan & Co., Limited, of Sunderland, having cylinders 19 in., 31 in., and 51 in. respectively, with a stroke of 36 in., steam being supplied by a large boiler at a working pressure of 160 lbs.

H.M.S. Wolf.—On January 7th H.M.S. *Wolf* went out for her full-power coal-consumption trial on the Clyde in the presence of the Admiralty representatives. Six runs, as usual, were made on the measured mile, with the following results:—

Miles.	Steam.	Time.	Speed.
1	218	2·1 4-5	29·57
2	218	1·58 2-5	30·41
3	223	1·59 4-5	30·05
4	224	1·57 2-5	30·66
5	224	1·59 2-5	30·15
6	224	1·57 2-5	30·66

The mean speed was equal to 30.31 knots for the miles and 30·11 knots the three hours' continuous steaming. The trial was made during somewhat boisterous and squally weather, and in

the fifth mile a fierce squall of wind and rain struck the vessel, causing her to heel considerably and, no doubt, diminish her speed. The trial was not only successful, but satisfactory in every way.

H.M.S. Seal.—On January 3rd H.M.S. *Seal* made a successful full-steam coal-consumption trial at 30 knots, when a speed of 30·04 knots was realised on the measured mile, and 30·02 for the three hours' steaming.

Boadicea.—On January 14th the fine new steamer *Boadicea*, recently launched by Messrs. Alex. Stephen & Sons, Linthouse, ran her speed trials on the Clyde at Skelmorlie. There were present Messrs. A. E. & F. J. Stephen, as representing the builders, and Captains Manley and Lund, and Messrs. Walker and Kitching, as representing the owners. The vessel is the second built at Linthouse for the Wilson & Furness Leyland Line, London, and is to be commanded by Captain Jacobsen, a seaman of great experience. The trial was a very successful one throughout, the mean speed averaging about 15¼ knots, while the machinery, though working at its utmost capacity, performed in a most admirable manner, giving evidence of the care and skill bestowed on the design and workmanship. The vessel and machinery were described at the launch, but a few particulars here may not be out of place. The vessel is 500 ft. 6 in. over all, 486 ft. 6 in. between perpendiculars, 52 ft. 3 in. breadth, 34 ft. 6 in. moulded depth, gross tonnage about 7,040; deadweight carrying capacity, about 8,500 tons; water ballast capacity about 1,100 tons; cattle carrying capacity, 660 head; nine large winches for the rapid discharge of cargo. The machinery consists of one set of triple-expansion engines; cylinders, 32 in., 54 in., and 90 in. respectively, by 66 in. stroke. Four large boilers, working at 190 lbs. pressure, and fitted with Henderson's patent fire-bars, Weir's pumps, duplex service and fire pumps, Quiggin's evaporator and winch condenser, with circulating pulsometer, large pulsometer ballast pump, Quiggin's feed filter; and generally all the latest improvements for convenient and economical working. The vessel is fitted with electric light throughout, and has accommodation for about 200 first-class passengers. After the speed trial the vessel returned to Greenock to make ready for embarking passengers next morning and sailing for New York.

Reviews.

The "Mechanical World" Pocket Diary and Year Book for 1898. Manchester: The "Mechanical World" Office, 1898.

This is really a wonderful six-pennyworth. It is a compact little volume, bound in cloth, containing space for a diary and also a couple of hundred pages of literary matter. The beginning of the second decade in the publication of the work has, in fact, been celebrated by a large addition to the contents of the volume, whilst the price has been kept down to that at which it has hitherto been. A great deal of information likely to be of use to the engineer has been embodied in the work. A large number of useful statistics as to the setting of valves, and as to steam pressures in engines, steam consumption, cylinder condensation, the consumption of coal and of feed water are afforded. The scientific method of setting of steam-valves is thoroughly elucidated by the furnishing of explanatory diagrams. The practice in regard to the indicating of engines is carefully explained. Much information as to the strengths and weights of various parts of the machine are tabulated. So are statistics regarding plates and rods of various metals at various thicknesses. Hydraulic notes are not forgotten. A good deal of mathematical formulæ are also set out, and now that aluminium is coming prominently into use in the arts, its place is found in the volume.

The present issue gives an addition to all that has been afforded by its predecessors by telling us something of the design of beams and girders. Thus it will be seen that there is brought within the reach of the humblest pocket a large amount of very useful and necessary matter.

The Royal Navy List Diary and Naval Handbook for 1898. London: Witherby & Co. 1898.

Messrs. Witherby & Co. have added another obligation to those under which all who belong to, or take an intelligent interest in, the Royal Navy have for a score of years laboured. This is quite a new departure. But it is one which, we think, should be a signal success. The publishers of "Lean's Royal Navy List"—the list which puts the breath of individuality and life into the dry bones of names and statistics—are responsible for the new step. The diary is of the same size as the Navy List, and each day of the year has a whole page for diary and notes. But a great deal of very valuable information is prefixed. There is the usual calendar with full astronomical notes. Then follows a very valuable *résumé* of the Naval progress of 1897 from the pen of Professor Laughton, the Naval historian. A sad *résumé* of the officers of the Navy and of the Royal Marines who have passed away during the year that is just gone by follows, and with it is given an extract from "Lean's Navy List" showing their war and meritorious services. An addendum shows the names of the officers of the Royal Naval Reserve who have been removed by death during the same period. It would be somewhat more graceful, we think, if, in the next issue, space were found for the names of deceased members of the R.N.R. in the body of the volume. But in the new publication after-thoughts may be pardoned. There is also set out a great deal of information as to the fleets of the world—especially as to that of our own country—and as to various public officials. Perhaps the greatest interest will attach to the somewhat meagre list of Naval men who received honours at Her Majesty's Diamond Jubilee. The volume may be said to contain what is usually found in useful publications of its kind, together with much that is of special interest and value to those who are connected with the senior public service.

Marine Engineer's Record Book. Engines. By Bryan C. Bartley. London: E. and F. Spon. 1897.

If it be true that time is money, he who affects economies in time should grow rich, and the production of a volume of the kind before us should be an opportunity for a lucrative investment of a few shillings to those with whose work it is concerned. The author takes the various parts of the marine engine, such, for example, as the low pressure cylinder and its valve, the condenser, the shafting, ands uch like and, as it were, opens an account for each, in a sort of ruled, ledger. In the columns ruled out can be given the dimensions, characteristics, weights, and streases of each part, and thus every detail of each engine in the drawing office may be analysed and arranged for rapid future reference.

The purpose of the author is to make this volume serve as a help in the drawing office, so that uniformity of design in the engines constructed may be attained without the constant trouble and loss of time entailed by frequent reference to old drawings. Thus, it is believed, time will be saved and better designs achieved, because a larger number of previous machines can be collated for the purpose of getting out the new details than could be looked through under ordinary systems. It will aff rd, too, an opportunity of seeing the old patterns which can be worked in when new sets of details are required. It is thought by Mr. Bartley also that young draughtsmen, who keep the book posted for their own benefit, will very much enhance their value as they proceed from one drawing office to another. The idea seems a good one, and the only difficulty seems to be whether those who get the book will continue to have the industry and patience to keep it thoroughly posted up. If some details be neglected, the value of the statistics will become very much diminished.

The Workmen's Compensation Act, 1897. By W. A. Willis. London Butterworth & Co., 1897.

This little book deals with a matter which is of the utmost importance to all those connected with some of the most extensive industries in the country, though, it is true, that *the* industry, that of those who go down to the sea in ships, is expressly excluded from its view. Still, it will affect one-half our workmen (and, of course, their employers), and it is astonishing that public attention has not been more drawn to the need for study of its provisions. It comes into force on the first of July, 1898, and it will affect a practical revolution in the rights and liabilities of those who come within its scope. It may be almost said that it throws upon the employer the responsibility of paying an insurance to the workman who meets with any accident in the course of his work, provided that the workman was not careless or wilful. It is by no means too soon to begin studying the provisions of this remarkable statute for the only relief possible to

the employer is by means of a scheme which shall meet with the approval of the authorities. Such a scheme will consist of a benefit and accident fund, to which employer and employed alike contribute, and which shall secure to the employé, in case of injury, at least equal benefits to those to which he would become entitled under the provisions of the Act. In many ways the Act introduces startling changes and absolutely new departures. All kind of old legal maxims are swept away by it—at least as regards proceedings under itself. Thus there can be here no defence of "contributory negligence." Then there are strange devices to enable the services of legal professional assistants to be dispensed with. But many of these provisions seem somewhat unworkable, and the wording of many of the clauses is vague, whilst the rights and liabilities of those affected by it are, in many cases, anything but clear and well defined. Under these circumstances there is no doubt that business men would do well to study their position, and a little book of this kind will be very acceptable. It seems to have been carefully compiled, and it has already reached a second edition.

Reed's Nautical Tide Table and Nautical Almanac for 1898. Sunderland: Thomas Reed & Co.

This publication is one of very long standing. But it has all the freshness of youth, for its publishers keep it thoroughly up to date. A useful nautical almanac showing the height and time of tide at Sunderland, the sun's declination for every day in the year, and various data of information in regard to nautical astronomy is afforded. Tables of high-water for many other important ports are added, and a long list of lights and buoys on our coasts, with their bearings and characteristics are set out. As is to be expected in a Sunderland publication, there is a good deal of local information as to the docks, their regulations and accommodation, and as to the public bodies of the port of Sunderland and of the river Wear. It will, as in previous years, prove very useful to all who are in any way connected with nautical affairs on the North-East Coast.

Refrigerating and Ice-Making Machinery. By A. J. Wallis-Tayler, C.E. London: Crosby Lockwood & Co.

It is not very many months ago that we reviewed this book on its first appearance, and already it is in its second edition. The seal of public approbation has therefore been set on the work. But in so brief a time as has elapsed since the work was first published there has been scarcely opportunity for the subject to develop itself, and accordingly the first edition is now little more than reprinted, though it is true that some twenty pages of new matter, and a score of engravings have been freshly introduced.

Whittaker's Mechanical Engineer's Pocket Book. By Philip R. Bjorling. London: Whittaker & Co. 1898.

This book springs itself upon us without foreword of any kind. One sees a title-page, a table of contents, and then plunges straight into hydraulic formulæ. But there is very soon seen a good reason why this should be so. The book is so brimming over with information that it is impossible to find room for these somewhat formal matters, and, besides, the contents speak for themselves. The statistics and formulæ of the usual kind are afforded in abundance, and there are also some tables which will be very useful, and which are not always seen in books of this description. Amongst the latter may be noticed those containing particulars of the weight and strength of flat ropes, the proportions of shackles and crane hooks, and the proportions of flat link gearing chains. The book is evidently framed with a thorough appreciation of the most modern needs of the engineer, and in paper, type and printing is everything that can be desired.

Abhandlungen des Deutchen seefischerei-vereins. Vol. I. Berlin: Otto Salle. 1897.

One of the characteristics of the shipping world at the present moment is the great extension of the steam trawler fleets both at home and abroad. This makes the moment peculiarly suitable for the production of such a volume as the present. The production of trawlers and of their machinery is treated with Teutonic thoroughness. Plates are afforded showing the lines and dimensions of both sailing luggers and steam trawlers with full details of their internal arrangements. The plans of the steam centre-board vessels with their arrangements for raising and lowering the heavy centre-boards are especially interesting and instructive, whilst the details of machinery are very full and extensive. These comprise drawings of the ordinary types of marine engines and boilers as applicable to fishing vessels, and of many specialities such as oil engines of various types, and the different classes of reversible and feathering propellers, which seem necessary adjuncts of this type of motor afloat. The book promises to be a monument of the state of this particular branch of shipbuilding and engineering as it stands to-day, and at the same time to be an invaluable work of reference to those who are concerned with the duty of designing, constructing, managing or working these very necessary, and very often very lucrative, vessels.

Pocket Book of Marine Engineering Rules and Tables. By A. E. Seaton and H. M. Roundthwaite. London: Chas. Griffin & Co., Limited. 1897.

This is already the fourth edition of this work, which aims at giving all things that may be of use to the modern marine engineer, and those who design and construct ships and their machinery, with as little as possible that may be obsolete, or useful only to engineers connected with other departments of work. That the aim really is to render practical assistance is made plain by the tables, which show certain limits which are applicable to various functions in various classes of vessels, such as cargo boats, fast paddle boats, mail boats, and the various types of warship. The various rules of Lloyd's, of the Board of Trade, and of the Admiralty, as to the strength, and tests of parts of the engines and boilers of different classes of vessels are set out. We get some indication of the practical value of the advice given in the book from the remarks on page 203 on "Pipes and Pipe arrangements." This is, as we all know, a very difficult question, and there are those who are strongly in favour of copper pipes, and those who believe that steel should be employed for modern pressures. Let us take the present authors' remarks on this point as a sample of their general system of dealing with controversial matters. Having spoken of the Admiralty practice of winding such copper steam pipes with wire for the purpose of strengthening them, it is pointed out that such a practice does not always give them more than their original theoretical strength, and that therefore "this method can only be regarded at best as a temporary expedient." It is pointed out that solid drawn steel pipes are now largely used, but that welded wrought-iron pipes are probably the best that can be used. Here is at once, in a few lines, a careful summary of the existing practice, an explanation of its difficulties, and a recommendation as to amendment. So it will be found throughout the book, that valuable hints are afforded as well as mere, dry statistics, and that brevity is studied in every direction.

The Marine Steam Engine. By the late Richard Sennett and Henry J. Oram. London: Longman, Green & Co. 1898.

This standard work originally made its appearance in the year 1882, and at once made itself a position, as was only natural considering its merits and the high professional position of the author as Engineer-in-Chief of the Royal Navy. Some three years later the author superintended the production of a second edition. Then ensued his premature death, and the rapid progress of engineering science has since rendered the book comparatively obsolete. Yet there was much in the volume which should not have been allowed to fall into oblivion, and we think it was a wise decision on the part of Mr. H. J. Oram, R.N., to undertake the somewhat severe task of modernising it. For this task Mr. Oram is peculiarly fitted, since he too is an engineer of wide experience, and likewise holds a position of great responsibility at the Admiralty. The new author evinces his respect for the original writer of the book by following as far as possible the style and arrangement which first characterised it, whilst at the same time of course adding a vast amount of new matter, and in certain respects necessarily re-writing parts.

The result of Mr. Oram's labours will be greatly appreciated by the profession at large, and certainly deserves the very brief word of encomium from Sir A. J. Durston, the present Engineer-in-Chief of the Navy, which appears at the commencement of the volume. In his initial chapter the present author brings the history of the development of his subject quite down to the present day, and we read with interest his forecast as to future progress. He believes that the 300-lb. boiler and 250-lb. engine pressure, which the water-tube boiler has given us, by no means marks the limit to which steam pressure will go, and in this direction (under proper conditions, of course) higher pressure means increased efficiency and greater economy in working. He

looks also to the greater use of the quadruple-expansion engine with their higher pressures. We must ourselves here admit our surprise that, with the 250-lb. pressure mentioned above, the Royal Navy did not already adopt the extra stage of expansion. But the use of higher pressure is not the only way in which further economies are anticipated. More complete combustion may be attained and the fuller use of the gases generated may be effected, and all these points shew that distinction may yet be achieved by the practical inventor.

The reader is taken over the subjects of heat and its application to water, of combustion of fuel, and of boiler efficiency. Interesting chapters on the modern questions of forced draught, especially as applicable to warships, and of liquid fuel. The arrangements for burning the latter, both alone and in conjunction with solid fuel, are explained and illustrated. The modern water-tank boiler (or, as we have been accustomed to call it, the cylindrical marine return tube boiler) with its various forms of tube and of furnace are gone into, as are the now somewhat discredited marine locomotive boilers. A good deal of space is very properly devoted to the water-tube boiler, of which type, the author tells us our Navy has upwards of a million H.P. now built or building. The types include all the well-known names, amongst which may be cited the Thornycroft, of *Daring* class, and the improved Belleville, which has only been introduced to quite the most recent cruisers. The various and somewhat elaborate fittings, which are so essential to the safe working of marine boilers, are explained by the aid of excellent diagrams, and then a chapter is devoted to the important subject of management and preservation of boilers. Then we proceed to the engine and regard the theory and application of the expansion of steam and thoroughly instructed as to the arrangement and action of steam valves. Thence to the cylinders and fittings which now-a-days necessarily comprise reducing valves. Much careful attention is given to the auxiliary machinery and to the care and management of the engines, and of all the multifarious appliances for the working, comfort, and safety of the ship which are found in the engineer's care. The chapter on the screw propeller is succinct and to the point, and it may well be said that brevity and lucidity are characteristics of the work. The book will be, or ought to be, in the library of every marine engineer, especially if he be in the Royal Navy.

Practical Engineer Pocket Book, 1898. Manchester: The Technical Publishing Co., Limited. 1898.

THE present issue of this useful and inexpensive little book has been re-arranged so as to make "the book a rough index to itself." This is a great improvement, for a vast amount of time may be saved to busy men by this innovation, and the value of the book is consequently increased beyond that of its eight predecessors. Still, the former index is retained, so that where needed it is still available. Fresh information has been added where usefully possible, especially in the treatment of slides, valves, guides, and the theory of inertia. For the use of those who need to determine the surfaces or volumes of rotary figures the theorems of Guldinus are introduced at page 247, and the compilers claim that this is the first occasion on which they have appeared in a pocket-book. It may be said, in conclusion, that amongst the numerous books of this kind which make their appearance annually, there are few to compare with this for comprehensiveness, combined with low price.

The Practical Management of Engines and Boilers. By Wm. Barnet Levan. London: Kegan, Paul & Co. 1897.

MR. LEVAN'S work is of American origin, and it may therefore be that it treats matters from a somewhat different standpoint from that from which British writers view the matter; and may perhaps account for the favour with which the first edition was received, and for the rapidity with which a second was demanded. The intention of the author is to give practical advice of a kind which may be useful to engineers and firemen, on the management of the machinery which is entrusted to them. He, therefore, in simple language, explains the theory and operation of the steam engine and the boiler. In his treatment of the latter he includes some reference to the water-tube boiler, which both on land and in naval ships is putting itself so greatly in evidence. Then he explains the use of and economy effected by the feed-heater, and he points out how the life and power of the boilers are increased by the provision of this adjunct, and gives useful tables to show the actual economy of fuel which its use effects. Now that engineers have so much to do with the management of electrical installations they will, no doubt, welcome the addition in this present edition of a chapter written by Mr. C. W. Swoope on the practical oversight of dynamos. Whilst another addition, the elaboration of the author's treatment of the subject of lubrication will, no doubt, tend to economical working of, and improved results in, the machinery under his reader's care.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—ED. M. E.]

EXPLOSION OF STEAM PIPES.

To the Editor of THE MARINE ENGINEER.

SIR,—In the issue of your Journal last November you have very properly drawn attention to what is becoming a most serious business through the great loss of life incurred by the explosion of steam pipes in connection with marine boilers, especially arising and daily increasing in number through the machinery and boilers demanding ever-increasing pressure either for propulsion or economy of fuel.

In your concluding remarks in the article referred to, you express the view that it can hardly be expected that the screw-down valve can be closed in time by hand to prevent a rush of steam, and you further ask why should there not be an automatic valve on every steam pipe close to the boiler?

Again, I note in your valuable Journal of December, 1897, Messrs. Bailey & Paasche advocate the automatic and the hand flat pivoted valves respectively, the latter gentleman reports that the question of protection from bursting steam pipes has been before his Government (Norwegian) consequent upon the application of the Norwegian Society of Marine Engineers for legislation on the subject, and in response, the Government have issued the following order:—"Every new steamship or ship having new boilers shall, in addition to the usual screw stop valve, have a system of arrangement of valve approved by the Government or Government Inspector, whereby in case of accidents to the main steam pipe, the steam from the boilers can be immediately shut off by operation from the engine-room as well as from the deck."

If you will be good enough to refer to your journal of January, 1897, I think all impartial readers will agree that you herein dealt with the question fully, and were the first to bring before the engineering world the great and growing importance of having a valve that will close readily irrespective of steam pressure.

In case of steam pipes, I claim that, if fitted with my spherical balanced drainage valve, referred to by you, it is physically impossible they can explode, but should vessels be in collision—such an accident has occurred and caused the displacement of the boiler—the valve can be immediately operated from the deck or engine-room. As to the automatic system advocated, its action is good in theory, but in practice unreliable, on board vessels, at any rate.

I may add in conclusion, in spite of the importance of this subject, that since your editorial was published last year on this new system of spherical balanced drainage valves, and its use in preventing loss of life, none of our societies have brought pressure upon our Government. I feel sure that if the facts were submitted through a deputation to Sir A. J. Durston, K.C.B., Engineer-in-Chief, R.N., good results would most assuredly follow. During the past year no less than 37 explosions more or less serious have occurred on board seagoing vessels, of which ten cases were due to steam pipe explosions.

In your issue of January, 1897, you refer to the experiments made by the German Government as follows:—"that with a boiler pressure of 70 lbs. only, water being allowed to accumulate in the steam pipes and the valves suddenly turned on, the steam pressure arose to and exceeded in one instance, the astounding pressure of 2,133 lbs. per square inch." This you were good enough to follow up by a reference to my valve as "representing a vast improvement on the old kinds of valve;" and in the earlier portion of the same article you sum up its advantages as being "balanced under all pressures . . . . and effective

means of draining pipes and other connections of water, created by condensation of steam, while it is so worked that no grit or sandy matter can get between the valve and seatings."

Yours faithfully,

10, Philpot Lane, E.C. JAMES CASEY, M.I.N.A.

January 22nd, 1898.

MR. McEACHRAN AND THE INSTITUTE OF MARINE ENGINEER.

To the Editor of THE MARINE ENGINEER.

SIR,—Referring to the report of the circumstances which resulted in the presentation by the underwriters, on January 5th, to Mr. McEachran, chief engineer s.s. *Tokomann*, a meeting of the Institute of Marine Engineers (of which Mr. McEachran is a member) was held Monday, January 10th, when a paper on Some Defects in Propeller Shafts was read and discussed. Naturally, the recent presentation in connection with this subject was referred to, and the meeting united in giving a warm expression of appreciation of the action taken by Mr. McEachran in effecting the repairs necessary to bring the ship into port, thus saving the expense of towage. The underwriters and owners' representatives have already signified their appreciation to Mr. McEachran, and the Institute of Marine Engineers now seeks to do so.

Congratulating the underwriters, owners, and Mr. McEachran on the result, for thus giving expression to their congratulations, one is reminded of a quotation which, at this season, when the sky is overcast around us, and rather clear in other regions where capital and labour are unitedly and keenly competing with advantage over us by reason of our cloudy atmosphere, rendered so by labour disorganisation, it may be not amiss to read again.

"They that are in power should be extremely cautious to commit the execution of their plans, not only to those who are *able*, but to those who are *willing*.

"As servants, it is their duty to do their best, but their employers are never so sure of them as when their duty is also their pleasure.

"To commit the execution of their purpose to one who disapproves of it, is to employ but one third—his heart and his head are against you—you have commanded only his *hands*."

Yours faithfully,

January 15th, 1898. JAMES ADAMSON, *Hon. Sec.*

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from December 8th, 1897, to January 6th, 1898.

27863 W. L. Wise (The Actiengesellschaft Weser, Germany) Valves.
27866 P. F. G. Oltmann. Lifeboat.
27872 W. D. Sandwell and J. G. Evans. Engines.
27874 A. M. Gallet. Marine signalling.
27896 A. Cotlon. Mechanical stokers.
27900 J. Shenton. Steam engines.
27948 E. Paul. Boiler feed-water heater.
27949 D. Drummond. Boilers.
27962 W. S. Thompson. Fixing a ship's position.
27977 W. Hornsby, D. Roberts, and C. James, jun. Connecting saddles for water-tube boilers.
27981 B. Grant and T. H. Lambert. Rendering decks non-slippery.
27984 S. and S. R. Chatwood. Steam engines.
28004 T. Mudd. Five-crank engines.
28019 J. E. Hartley, E. Binns & Hartley, & Sugden, Limited. Boilers.
28062 F. S. Smith. Vessels.
28079 J. Phipps. Furnace bars.
28111 J. Esplen. Valves.
28122 J. R. Fothergill. Steamship propeller shafts.
28123 J. W. Pearson and W. J. Wood. Trawl nets.
28124 E. T. Cleathers. Funnels.
28223 J. Schwarz. Lubricators.
28314 E. P. Haslam, F. Grover, P. F. Kendall, and H. Woodward. Cleaning ships' bottoms.
28315 P. G. Kendall. Examining ships' bodies.
28326 R. H. W. Thirkell. Cleat for ships' hatches.
28334 C. Brown and L. A. Peuleve. Mechanical feeding devices.
28348 S. Forter. Reserve valves.
28390 A. J. Boult (M. H. Rumpf). Internal combustion engines.
28398 H. G. Owles. Funnel.
28401 H. Forster. Rotary pumps.
28430 W. Hinchliffe and J. W. Harrop. Lubricating piston rods.
28431 J. Heatherington. Rudders.
28436 I. Evans. Preventing boiler explosions.
28471 J. R. Wood. Hydraulic low-pressure engine.
28489 P. C. F. Hoffmann. Submarine mines.
28517 J. Ormrod. Boilers.
28557 G. Oliver, T. Blease, and C. Norfolk. Trawl warps.
28619 J. P. K. Clark. Governing screw propeller engines.
28624 C. Dowsen. Steam generators.
28627 L. Rushworth. Furnace door for boilers.
28657 G. W. Mallet. Cleaning hulls of ships.
28662 R. S. Baxter. Vessels.
28675 J. Prestwich. Valves.
28681 W. H. FitzGerald. Boats.
28732 J. Burgum. Propeller-controlling apparatus.
28743 W. S. Watson. Travelling box and punt.
28748 J. W. Tunstall and J. Parkington. Crank attachment.
28759 J. E. Wolff. Anchors.
28770 W. Rathbone. Swimming apparatus.
28786 T. J. Frost. Draught destroyer for ships.
28841 R. Wilson and S. Goodman. Furnace bars.
28847 G. Smith. Removing deposit from boilers.
28856 W. Midgley and A. Barker. Automatic valve.
28913 J. O'Meara. Valves.
28922 R. Haddan (J. E. Whiting, India). Submarine tubes.
28956 J. H. Kelman. Cables.
28992 C. Tennett. E. A. and J. H. Verity. Boilers.
29001 W. Browning. Bulkheads.
29003 T. Thompson. Conveying bicycles on boats.
29006 A. E. Hills. Water-tube boilers.
29015 L. Morgan. Propelling boats.
29025 W. Robinson and J. Leyman. Winches.
29057 J. R. Howarth. Adjustable funnel and support.
29062 W. S. Smith and W. P. Granville. Electric cables.
29068 E. S. Young. Screw propellers.
29081 J. H. Hind. Closing water-tight doors.
29082 W. Sisson. Crank shaft engines.
29088 A. Pfister. Purifying water for boilers.
29106 A. B. Brown. Telemotor for marine engines.
29125 J. Haynes. Self-oiling bearings for shafts.
29135 E. Sharer. Ships' ventilators.
29185 T. E. Norton. Anchors.
29216 R. Neilson. Boilers.
29232 A. G. Lyster. Hopper Barges.
29243 W. Jeans. Cranks.
29269 L. E. Cowey. Boat-lowering apparatus.
29271 T. Scott. Boilers.
29272 J. McCulloch. Valves.
29332 T. Downie. Filtering generator feed-water.
29339 R. A. Fraser. Instantaneous steam generators.
29344 J. M. Webster. Speed indicators.
29367 W. Lengfield, C. E. Ward, and G. H. Wise. Trawl boards.
29412 M. M. J. O. O'Conor. Ascertaining position of wrecks.
29413 M. M. J. O. O'Conor. Ascertaining position of ships.
29486 G. Durr. Steam generators.
29503 R. W. Stokoe. Doors for boiler furnaces.
29519 A. J. Lyster. Drying moisture from ships.
29532 Z. Lander. Buoyant life-saving door.
29573 H. E. Newton (C. C. Worthington, United States). Pumps.
29592 J. A. Purves. Lighthouse apparatus.
29618 F. J. B. Cordeiro. Sextants.
29632 H. Davey. Compound pumping engines.
29671 J. Kippax. Removing grease from boilers.
29678 F. R. Patey. Boat-disengaging appliance.
29817 S. E. Asquith. Reducing friction in shafts.
29836 R. Harte. Pedal-operated navigable vessels.
29839 J. Codd. Packing for hydraulic pumps.
29888 E. Jones. Operation of watertight doors.
29933 E. Williams. Steam turbines.
29958 W. H. Martin. Pumps.

29972 F. Windham. Boilers.
29981 W. H. Allen, Son, & Co., and J. W. Kempster. Drilling machines.
29983 W. Weir. Pumps.
30016 A. J. Loftus. Signal lamp lenses for ships.
30046 D. Vaughan. Steam boiler feed injectors.
30054 J. Charlton. Packing rings.
30071 S. L. Taylor. Positive action speed indicator.
30073 H. W. Mackenzie and A. O. Robertson. Friction clutches.
30096 W. Hornsby, D. Roberts, and J. W. Young. Starting internal combustion engines.
30106 G. V. L. Chauveau. Combustion engines.
30120 C. W. Brompton. Otter-boards for trawling.
30168 J. Blake. Steam generators.
30182 R. Conrad. Balancing devices for engines.
30186 D. Roozski. Turbine propeller for ships.
30188 L. Levi and G. Cartwright. Expanding the mouths of trawl nets.
30194 A. M. Galiet and A. J. Curtis. Closing holes in the hulls of vessels.
30212 W. P. Thompson (J. C. Keough, United States). Mechanical stokers.
30219 A. Striemer. Carrying device for flexible shafts.
30226 G. Black. Juggling and bending ship frames.
30243 L. Katzenstein. Packing for piston rods.
30255 A. Jeffs. Trawler fishing gear.
30271 G. M. Harroway. Well spaces in steamers.
30274 W. H. and R. W. Allen. Furnace for boilers.
30304 G. H. Richmond and J. Crowther. Stop valves.
30348 H. H. Lake (J. B. Opsahl, Canada). Steam engines.
30351 A. J. Boult (J. M. M. Truffault, France). Steam generators.
30366 W. J. Calder. Construction of rotary engines.
30391 C. Johnson. Folding ships' berths.
30403 H. McLachlan. Gauge glass sentinel.
30407 A. Wälde. Utilising exhaust engine steam.
30463 J. T. Wainwright. Armour plate.
30478 L. Marshall and S. Naylor. Boiler making.
30479 E. B. L. Morris. Furnace stoking.
30484 J. and W. Evans and A. Hopwood. Steam boilers.
30522 J. F. Green. Apparatus for obtaining motive power from the tide.
30533 G. J. Kirby. Fishing tackle.
30544 O. Parpart. Electric welding of tubes.
30550 E. H. O. R. Ropner. Cargo carrying steamers.
30554 J. J. Apsey, W. J. Norminton, and G. Hodges. Driving gear for boats.
30563 A. N. Chamberlain and W. L. B. Hall. Lee rails for ships.
30569 E. Howl and W. W. Attwood. Direct-acting engines.
30624 J. H. Irwin. Construction of steam boilers.
30636 J. L. Grandison. Sight-feed lubricators.
30694 A. Duwoos. Docks.
30714 G. Cockburn. Safety valves.
30716 J. Davie. Cleaner for flues of boilers.
30737 H. See. Increasing heat of boiler furnaces.
30777 C. Bliault. Construction of cargo steamers.
30825 J. Summerville and F. Davidson. Gauge glasses.
30909 G. F. W. Hope. Excavating or dredging.
30932 W. T. Carter. Propulsion of torpedoes.
30934 J. T. Wainwright. Manufacturing armour plate.
1 E. L. Berthon. Preventing oscillations of tables on ships.
38 J. R. Wigham. Illuminating buoys and beacons.
79 F. S. D. Scott. Propulsion of ships.
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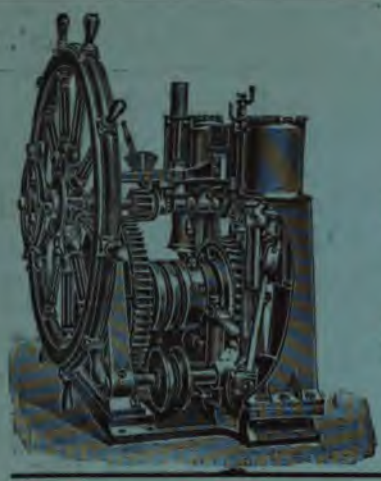

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The Marine Engineer.

LONDON, MARCH 1, 1898.

As we are going to press the world has been startled by a most lamentable disaster to the United States cruiser *Maine*, one of the finest warships of their Navy, of over 6,000 tons. The disaster was an explosion in the forward part of the ship which caused great havoc in the quarters of the crew, and much loss of life to them, as they had all turned in with the exception of the watch on deck. The ship immediately caught fire, and successive explosions of the magazines and boilers completely wrecked the vessel, which foundered at her anchorage. Owing to the political tension at present between America and Spain on the Cuban question, much suspicion has been aroused as to possible foul play having produced the melancholy disaster. It is difficult, however, to imagine that this can have been possible. Any attack from outside to have produced so instantaneously disastrous an effect upon a vessel of such size and strength, could only have been effected by the employment of the most powerful and modern torpedo or similar offensive submarine mine. As the evidence of such an insidious external attack would always be readily ascertainable by after-examination of the hull, and as such weapons of gigantic offensive power could only have been in the hands of Spain's Government forces, the possibility of their employment even by stealth in the hands of an inferior can hardly be considered, nor can it be imagined that anyone of the irresponsible mob on shore who might be vindictively inclined, without much risk of being identified after commission of an outrage, would be in possession of an offensive bomb or weapon that could effect such destruction by external application or have any access to the interior of the vessel, or any opportunity to set in operation an internal bomb in the vicinity of any magazine. The explanation of the disaster must, we think, be sought in some accidental cause of explosion to the forward magazine. The forward magazine was surrounded by packed coal, and it is not the first time on board American cruisers that such coal has spontaneously ignited. This occurred about two years ago in the *Cincinnati* and *New York*, although the magazines were flooded in time to prevent the fire reaching the explosives. The Americans are also very fond of employing new fangled explosives, and it may be that some of these, if on board, were capable of disruption and disorganisation by time, or by an abnormal temperature such as might be generated in the surrounding coal, even without actual ignition. If even a small quantity of any unusual or comparatively unknown explosive were present in any of the forward magazines, this in itself might be amply sufficient to account for the terrible disaster, and we will hope for the credit of humanity that some such explanation will eventually be forthcoming.

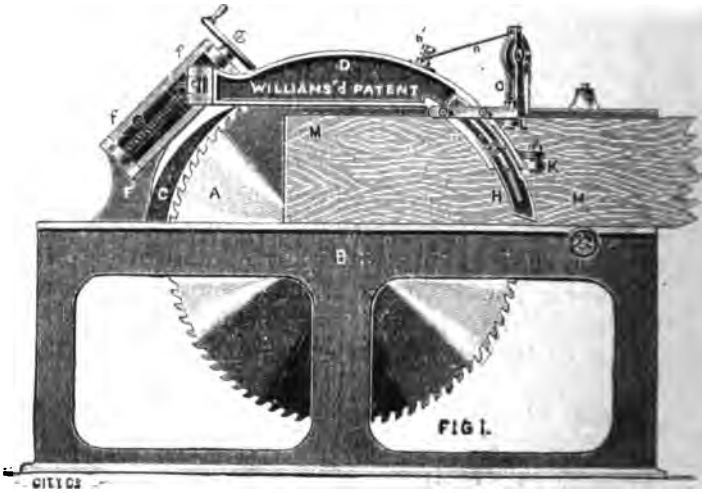
Economy of steam for the production of a given H.P. and economy of fuel for the production of such steam has been a subject in which great strides have been made in marine engines during the last generation, and though further advance in this direction seems to us now to be hardly practicable, there is still an enormous proportion of fuel going to waste if engineers could only see their way to utilize it. The two great sources of present waste of heat are, first, the apparently necessarily high temperature of the gases of combustion at which they are allowed to pass to the uptake, and the large percentage of heat from the steam after condensation that must be thrown away. It does not appear that the escaping hot gases can be reduced below a considerable margin above the temperature of the high-pressure steam now generally employed, but for the sake of a good draught the temperature of escaping gases is usually much higher than this minimum. Whether artificial means for increasing draught with a corresponding power of reduction of the temperature of the escaping gases, can be economically utilized, and how such unnecessary heat may be usefully extracted from such escaping gases, is a problem for the future. It is not probable that it will pay to increase the evaporative surface of the boilers much further than at present, if at all, as such increase of surface would be of little evaporative efficiency, whilst adding considerably to the size and weight of the boiler and contained water, which would be an obvious disadvantage. The utilisation of such waste heat must therefore be sought in other ways than in direct evaporation in the boiler. Feed-water superheating—slight steam superheating—evaporation for ultimate condensation for fresh water purposes, are objects that have all been more or less utilized. We have not heard, however, of such hot gases from uptakes being utilized for state-room or saloon warming, or for the jacketing of the steam cylinders instead of with the live steam, as is usual, which in its present mode of application absorbs a perceptible percentage of the effective H.P. of the boilers. If the application of such hot gases direct to warming or jacketing is inconvenient, though we do not see why it should be, it could be utilized for warming hot circulating water for such purposes. We have no doubt that our practical readers will have many suggestions to make for the utilization of such waste heat from the escaping gases, and if so, we

shall be pleased to give publicity in our correspondence columns to such suggestions. The utilization of the waste heat of the hot well, after withdrawal of about 1-25th part for feed, or of the waste heat of the circulating condensing water in surface condensers, seems to be an almost insoluble problem, though such waste heat in a dissipated form represents probably nine-tenths of all the heat originally imparted to the steam. But more unlikely problems have been, by the exercise of man's ingenuity, successfully solved at last. The position of the present system of conversion of heat into power by steam boilers and steam engines, however perfect, is as if we were working a gold mine with nine-tenths of the valuable metal going to waste in the tailings. So there are still gigantic problems awaiting the solution of the coming race.

The introduction of exceptionally high pressures of steam in marine boilers, consequent upon the adoption of the tubulous system of boilers, will probably produce quite a new crop of troubles in the engine-room. Higher pressures mean higher temperatures, and the higher temperatures of the steam in the steam-pipes, valves, and high-pressure cylinders will tend to produce evils which have no place in the use of steam of more moderate pressures and temperature. The tendency will be for the lubricants to char or burn, and the result will be trouble in the high pressure cylinder and piston rings, and particularly on the steam valve faces, which will probably gall and cut. Perhaps the most satisfactory solution for these troubles would be the use of the so-called anti-friction metals or compositions, which will serve to keep metal faces in good condition without the use of added lubricant. A further safeguard is to take care that the steam is not superheated, but is just on or even a little below saturation point, so that there is some deposition of condensed water in the cylinders. Though such water is in itself a drawback as regards highest pitch of economy, and though an excess would be a danger, yet the presence of a certain amount of moisture in the high pressure valve chests and cylinder would be a great protection to the wearing faces. A still greater evil consequent on the use of extreme pressures of steam is the effect of the high temperature upon valve faces and seats by reason of irregularities of expansion. A stop valve seated in the usual way upon a gun-metal seating in a cast-iron valve casing, however carefully it may be fitted and seated when cold, will be found to leak and blow through when in contact with extremely high pressure steam. Cast-iron and gun-metal have quite different co-efficients of expansion for equal increments of heat, that of gun-metal beingconsiderably in excess of cast-iron. If then a gun-metal seating is fitted tightly, as it must be, into the floor on a cast-iron valve box, and considerable heat is imparted to both, it is obvious that the gun-metal seating may either burst the cast-iron casing, or, failing that, will buckle and warp until the valve no longer makes a true joint upon it. The solution of this difficulty may be sought in either employing valve seating and case of a single metal, or of metals of similar co-efficients of expansion under heat. Or alternatively, a new form of valve and seating must be devised in which diverse amounts of expansion in various parts will not buckle or disturb the truth of the faces which have to make a joint. We foresee that the present evolution of high pressures will give marine engineers some pretty problems to solve.

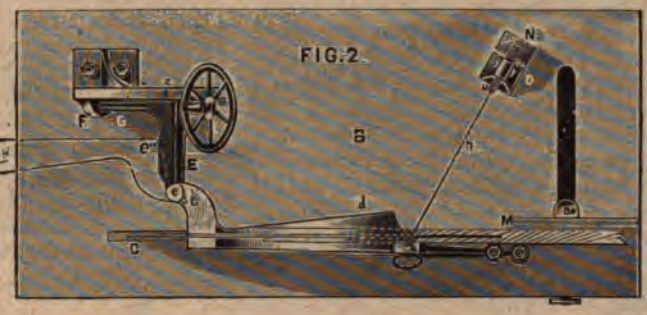
THE "VICTOR" CIRCULAR SAW GUARD.

As in all large shipbuilding and marine engineering yards, circular saws are perhaps one of the commonest of tools, and as, owing to the large number of accidents which have resulted from the generally very insufficiently protected character of these tools, the Home Office has instructed factory inspectors to press upon occupiers of works in which such saws are common the absolute necessity of providing some guard for the saw itself, with the stipulation that merely providing boards or shutters for the frame of the saw below the table is not sufficient, and that the scheme must include a riving knife fixed at the back of the saw—it will be interesting if we furnish our readers with a description and illustrations of a new circular saw guard, which has been designed by Mr. E. Williams, of Chester, with the object of meeting



the above requirements. This saw guard, which is termed the "Victor" shield, is constructed on quite a new principle, and is altogether different from any appliance that has so far been brought out for the purpose. The guard completely covers the part of the saw which is above the bench, so that if a man

fell upon it he would not be injured thereby, and it is readily adjustable to any size of saw, whilst it can be instantly removed out of the way for changing saws or for sharpening. The guard also prevents pieces of timber, knots, or sawdust being thrown over from the back by the saw when running, and still there is clearance for the sawyer to have a full view of his saw. The shield is automatic in action, and does not interfere with the operator in his work; it entirely covers the saw whilst in and out of operation, and



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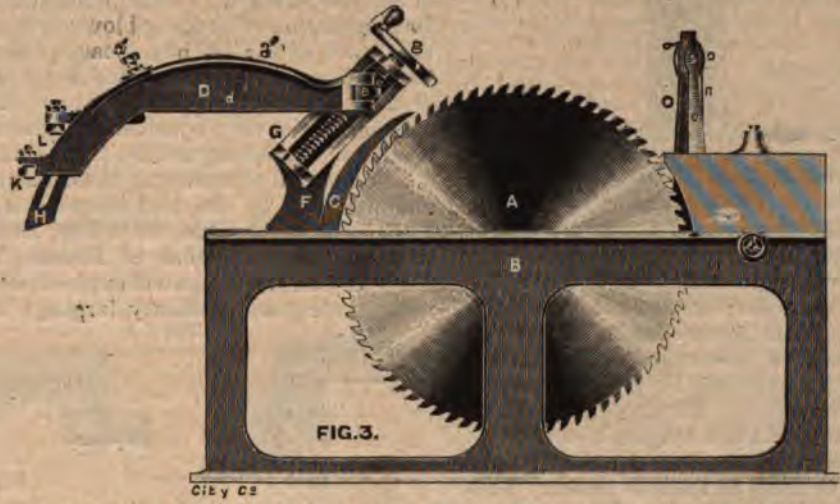
can be practically used without loss of time. Another important feature is the introduction of a small roller which is attached to the hood, and is arranged to guide the timber and hold to the fence the last top corner of the deal or block right up to the finish, thus avoiding the use of the hand at the most dangerous and critical part of the operation. It may also be mentioned that the guard can be fixed and used with any of the various roller feed motions on circular benches. The accompanying illustrations show very

front edge of the hood, and one or more rollers are fitted to press against the timber as it travels forward to the saw. The circular saw A and the bench B are of ordinary construction, and C is a riving knife fixed at the back of the saw A. These knives, which are made of steel, vary in size according to the diameters of saws, and a full-size saw can be used with them, as they are constructed to fit on the bench without taking up any of the gap of the saw. In cases where it would be difficult to use these knives, as on general jobbing benches, and benches sawing and converting English timber, an adjustable hinged piece is attached to the hood D to cover the back of the saw, and this lifts up out of the way when the timber comes against it, and drops down again behind the saw when the timber is through, to prevent any loose timber dropping on it. The swinging hood D, which is in front of and extending over the top of the saw, and has a front plate *d* and top curved plate *d'*, is pivoted to an arm E to a bench, so as to be capable



clearly the construction and application of the "Victor" shield, Fig. 1 being a front elevation; Fig. 2 a plan; Fig. 3, front elevation with guard turned back, and saw clear; and Fig. 4, end elevation. Briefly, the device consists of a guard constructed with a hood which covers the saw-teeth at the front and on top, pivoted to a radial arm, which is supported at one end upon a screw set in an inclined position, whereby the turning of the screw raises the hood, and at the same time draws it forward, or *vice versa*, whilst a sliding extension piece is provided for the

of swinging or opening in a horizontal plane, to allow timber to enter between it and the saw A at the front, and to come out under it at the back of the saw, and permit of its being turned into the position shown in Fig. 3 (and by dotted lines in Fig. 2). The pivot *e*, upon which the hood swings, is placed behind the plane of the saw, so that very little force is needed to move or open the hood to allow the timber to enter, the movement to one side for this purpose not being sufficient to uncover the saw. The arm E is mounted in a slide *f* in a bracket F, in which it is raised and

lowered by a screw G, from which it stands out at right angles. The bracket F is affixed to the same bench, and the screw G, which is turned by a hand wheel *g*, extends from one end to the other of the slide *f* and is inclined to the vertical at an angle of about 45 degs., so that the movement of the screw to raise the arm E, and with it the hood D, also advances the arm and hood towards the front of the saw. This movement prevents the front edge of the saw coming into contact with the saw when a large one is introduced, and also prevents it standing out too far from a small saw. The length of the arm E is such that the bracket F can be set a considerable distance behind the saw, and thus be completely out of the way when the saw is in action, and not interfere with the free passage of timber past the saw. To the front end of the hood a sliding extension piece H is bolted, by which the former can be lengthened to any desired extent, so that, as it is raised up to accommodate a larger saw, the extension piece H can be lowered to a level with the bench B to cover the front of the saw.

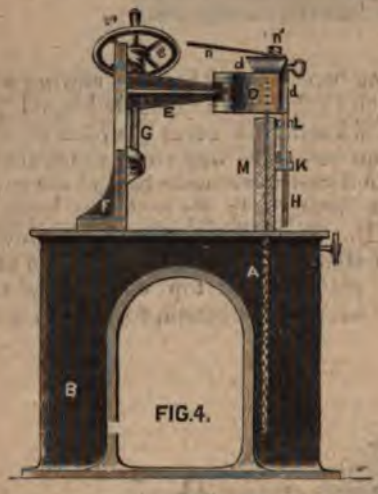


FIG.4.

In flat cutting the extension piece H is lifted sufficiently high to allow the timber to pass under it, and the hood D then remains stationary. At the front end of the hood a small roller K is fixed, against which the end of the timber M comes in contact as it is pressed forward to the saw; the roller mounting it causes the hood to swing back on its pivot *e* sufficiently far to admit the timber. Above the roller K is placed a second roller L fixed to the hood D, to which reference has already been made. The hood is held in position when in operation by a weight N connected to the hood by a cord *n* passing over a pulley *o* supported by a bracket O fixed to the saw bench. This bracket can be kept off the bench entirely where necessary. The cord *n* is connected to the hood D by a set screw *n'*, which also fastens a handle. The hood is provided with a stop *e'* to prevent its being drawn too far forward by the weight N, and with a stop *e''* to prevent its swinging too far back in the reverse direction. We have had an opportunity of inspecting one of these saw guards in operation, and certainly it fulfils the objects for which it has been specially designed. It may also be added that the Government inspectors, under whose notice the "Victor" shield has been brought, are strongly recommending its adoption, and it has already been supplied to a number of large saw mills in various districts, where it has given every satisfaction. It should be further mentioned that the sole manufacture of the "Victor" Shield has been placed in the hands of Messrs. Hy. Wallwork & Co., Charter Street, Manchester.

"STAMPINGS" FOR MARINE WORK.

THERE are many articles now stamped or drop forged, which only a few years ago were thought impracticable; therefore, since the great development in this line, a few words as to application to marine work, &c., may be of interest. As, for instance, it may not be largely known that propellers for torpedoes, both 2 and 3 blades (Figs. 1 and 2), are now classed among stampings, but such is the case.

The previous methods of manufacture were either castings or ordinary forgings; in the former case they

FIG. 1.

FIG. 2.

were unreliable, and after much expense had been laid out in the finishing, a large percentage, on account of the appearance of specks or blow holes, would not pass the hawk eye (aided by a magnifying glass) of the Government inspector. In the latter case, the forgings at their best were so much larger than the finished article that a very considerable extra expense was needed in machining and finishing same.

The method of stamping these has been introduced and patented by the well-known stampers, Messrs. Thomas Smith & Sons, of Saltley, Ltd., Birmingham, who at the instigation of Messrs. The Whitehead Torpedo Co., Ltd. (who had experienced much difficulty with casting and ordinary forging) made their first

FIG. 3.

FIG. 4.

attempt which turned out a complete success, and much to the satisfaction of the great torpedo makers.

Stampings, when quantities of the same article are required, are undoubtedly a great advantage, as they can be made so closely to pattern, that only a very small allowance above the finished pattern is necessary to machine off to bring it to the finished size, and be depended upon to be clear without "specks" or "grays" when finished.

The strength of a stamping is no doubt superior to that of a forging, inasmuch as the material is improved

by the compression which closes or condenses the grain of the material and makes it more homogeneous.

This opinion is one that has proved itself this last 25 or more years ago, when Messrs. Smith & Sons, who first introduced the stamping for components, and furniture for sporting and military firearms, received much opposition from the gun makers, who at first doubted the superiority over hand forgings, but time has proved in this, as in many other things, that stampings are in every way superior to hand forgings. It therefore may be said that there are at least five distinct advantages in stampings: That the cost is considerable under the price of ordinary forgings. It is only a trifle more than the price for castings. It can be made exact to pattern. Considerable less cost of finishing. The metal being improved as before

Fig. 5.

described, is far superior to castings and superior to ordinary forgings.

This method appears to us to be one that can be recommended where a quantity of propellers of one size are required for small launches and the like. As for ordinary purposes they would require very little in finishing, and being of wrought steel can be made lighter than castings of equal strength, as well as more reliable.

Messrs. Smith & Sons are also extensive stampers for all purposes where iron and steel is required, and are already known to many of the shipyards and engineers for man and hand-hole covers for boilers, eyebolts, engine cranks, and cranks and shaft, with eccentric made out of the solid (Figs. 3, 4, and 5), sizes up to 2½ in. shaft; and for engineers' spanners, of which they make patterns both straight jaws and at angles of 15, 30, and 45 degrees and sizes from ¼-in. to 2-in. bolts.

DEFECTS IN PROPELLER SHAFTS.

(*Continued from page* 431.)

MR. HAWTHORN said he had read Mr. Aisbitt's paper very carefully, and there was much in many of the points which the author had brought forward as to the causes of corrosion in tail shafts, but the author appeared to have overlooked one cause and that was the action of the air admitted to the stern tube when the engine were racing. They all knew that the surface of the water was thoroughly impregnated with atmospheric air, about 15 cubic feet of water containing one cubic foot of air. It was possible that as the result of the churning of the water in the stern tube this air might be stimulated, and there was no doubt that it might be in contact with the iron of the shaft sufficiently long for the air to become decomposed. The oxygen entered into chemical combination with the iron, and they would thus get rust—the beginning of the trouble; and they all knew that sea-water was the second best of all liquids by which a current of galvanic electricity could be conveyed. The iron rust being electro negative to the iron's electro positive, they thus had very powerful elements to assist corrosion. He could not agree with the author in thinking that mechanical action might be left out of consideration altogether as one of the causes of corrosion and trouble in tail-end shafts. Mr. Hawthorn gave figures illustrative of the enormous strain brought upon a tail shaft in a seaway, taking for illustration a 12-in. shaft, transmitting, say 1,800 H.P., when running 60 revolutions; this twisting moment alone, he said, would give about 3,000 lbs. stress per square inch in torsion. The bending moment with a 6-ton propeller, wholly immersed, would at a distance, say of 24 in. from the sternpost, give a bending stress of about 1,600 lbs., and the equivalent twisting moment, with these combined, would result in a stress of about 10,500 lbs.; and then imagine the ship's stern to lift, so that 75 per cent. of the weight of the propeller was suddenly lifted out of the water. The bending moment would be that due to a weight of about four tons suddenly applied, and this would result in the bending stress tension on the upper surface and compression on the lower surface of three times the original amount. And these increased stresses being suddenly changed, upon the ship suddenly dipping her stern, would no doubt fatigue the metal very much on the forward side of the after liner, and would account for some of the flaws found there. He then gave his reasons for believing that the twisting moment was equivalent to a stress of 15,000 lbs. per square inch. There was another point that occurred to him, and that was that stern tubes were not always full of water, and that the action of the shaft had a tendency to create a vacuum immediately next to the shaft. If he was correct in that view, the air only remained sufficiently long to set up the air-cones, they had the beginning of rust. As a precaution against corrosion he strongly recommended the use on tail shafts of a paint or composition containing a large proportion of zinc. He also thought the plan of running the shaft in white metal and oil was a good one, and mentioned the plans of one manufacturer, who fitted the stern tubes so that the parts between the two liners was get-atable. He considered further that there ought to be some means of shutting off the stern end altogether, and thoroughly draining the stern tube in port, for his opinion was that the corrosion was much more active when the ship was in port, and the stern gland nipped up; the water then was more stagnant. He thought it a barbarous method to carry water in the stern tube at all, and did not see the necessity for having stern tubes so long as was usually the case.

The Chairman, alluding to a suggestion by Mr. Hawthorn that the weight of propeller shafts was cut rather too fine, said, of course, it was desirable that they should keep down the weight of shafts as much as possible for a given power; but the practice of some of the larger owners in making their shafts a good deal in excess of the Board of Trade requirements had been a great safeguard. It was really a question of weight *versus* strength.

Mr. M'Farlane Gray said the Board of Trade requirements having been referred to, he should perhaps explain that the rules specified the minimum sizes in each case.

The Chairman: It is something like the medicine on board ship. There is a minimum scale, but there is no reason why you should not double it.

Mr. Gray: It shows the danger of having rules laid down for everything by a Government Department. It is just the same thing with the Load-line Rules. A minimum freeboard is prescribed in each case, and if there was no load-line prescribed at all, vessels would probably have more freeboard than they have now.

Mr. Hawthorn asked if any gentleman could inform him when the rudderpost bearing for tail shafts was abandoned—(A Member: 15 or 20 years ago). His own opinion with regard to this abandonment was that the remedy had proved worse than the disease. It has given more liberty of action, but the fractures of shafts had become much more frequent. When they had rudderpost bearings the tail shafts were not so likely to break in a heavy sea as now, and with the powers that were now being put into steamers he was afraid they were cutting things too fine. He thought we ought to put more weight into our shafts. Another inch, or half an inch, in diameter would not add much to the weight, say, with a 12-in. shaft increased to 13 in,, remembering that the resistance to torsion and bending varied as the diameter of the shaft cubed. Therefore, the 12-inch shaft would have 27 per cent. more power of resisting these excessive strains, and the strength would be increased enormously.

Mr. M'Lachlan said he believed that the patent stern tube referred to by Mr. Hawthorn was fitted into one of the China steamers some years ago, but gave serious trouble, and had to be taken out and an ordinary stern tube substituted. He had had experience of a similar accident to that which Mr.

M'Eachran had to deal with, the tail-end shaft breaking in the same place, but much further in. He conceived the same idea as Mr. M'Eachran, but owing to the ship having such very fine lines it was impossible to carry it out. The shaft was examined in Antwerp before the ship left that port, and was found to be in beautiful condition. The shaft was fractured in the same way as they would break a tap. The liner of that shaft was tapered away, and there were no signs of corrosion whatever, from which he concluded that the cause of corrosion at the end of a liner was entirely due to the sawing action of the water.

Mr. Blair said this was a paper that would interest all marine engineers very much indeed, because tail shafts and propeller shafts had been a source of very great trouble during the last two or three years. He had had a good deal to do with shafts both when engaged with a large repairing firm in London, and since he had been in his present position as a superintending engineer, and this action that went on at the back of the liner was, he thought, well known to every sea-going engineer. When the liner came sharply out there was this cutting action at the end of the liner, whereas, by tapering the liner away and rounding it off, the cutting action was pretty well avoided. Instances had occurred where the liners had been thinned away, and after a while found to be loose, and having been cut off it was ascertained that corroding action had been taking place under the liner. Perhaps this was due to the fact that the liner was cut away too thin in the first instance. Of course, the great point was to find a remedy for all these mechanical and other troubles that had been referred to, and he did not know that they had yet arrived at the right conclusions. He had tried the practice of protecting the shafts with marlin and they never gave any trouble. During the last 12 months he had to condemn four shafts through this eating action that had been going on at the ends, and they were all of larger size than required by Lloyd's rules. They had increased the size over half an inch in excess of Lloyd's requirements to guard against this trouble of the shafts cutting away. Mr. Hawthorn was, he thought, quite right when he said that a great cause of trouble was the taking away of the outer bearing of the tail-end shaft. There could be no doubt in his mind that the abandonment of the outer bearing was a great detriment to the shaft. This outer bearing in the rudderpost was a great assistance to the life of a shaft, and when a ship was surging in a heavy seaway the action of the propeller must involve a tremendous strain on the shaft.

Mr. James Adamson read a letter that had been received from Captain Blackmore, who wrote:—

"I am sorry the state of my health prevents me from going to a distance from home at night. I should much like to have heard Mr. Aisbitt's paper on 'Certain Defects found in Propeller Shafts.' Without seeing the paper I cannot, of course, know to what kind of defects he has referred, whether original defects or those caused by wear, vibration, racing, &c. As I am of opinion that many broken propeller shafts are due to certain classes of steamers being sent on oversea voyages insufficiently ballasted, and with propellers not sufficiently immersed, I should be glad to see any evidence confirmatory of my idea, and to know what the ideas of sea-going engineers are upon that surmise."

Mr. M'Laren spoke of the great strain that was brought on tail-end shafts by the manner in which the propellers were wedged off in dry dock; and Mr. Shorey and others also spoke on the subject.

At the instance of the chairman, seconded by Mr. Shorey, a hearty vote of thanks to Mr. Aisbitt for his interesting paper was unanimously agreed to, and a vote of thanks to Mr. Thomson for presiding concluded the meeting.

A MEETING of the Institute of Marine Engineers was held on January 31st at the Institute premises, 58, Romford Road, Stratford, when the subject of discussion was the paper by Mr. M. W. Aisbitt, read at a previous meeting, on "Certain Defects in Propeller Shafts." Mr. James Adamson, the honorary secretary, presided.

The Chairman, in opening the proceedings, alluded in very feeling terms to the recent sudden death of Mr. John H. Thomson, one of the founders of the Institute, and for some years chairman of its council. At its last meeting the council passed a resolution of condolence with the aged mother and other relatives of the deceased gentleman, and a similar resolution had been passed by the Bristol Channel Centre, where Mr. Thomson was well known to many of the members. When Mr. Aisbitt's paper was read, it was intended that a number of lantern views, illustrative of the various defects and troubles referred to by the author, should be shown upon a screen, but unfortunately the lantern slides had not then come to hand. They had since been received and would be shown that evening before the discussion was resumed.

A large number of lantern views were then shown upon the screen, and Mr. Ruthven, the convenor of the Papers Committee, read the explanations of the same furnished by the author. Two views representing the broken shaft of the *Tokomaru* were also shown.

Mr. Ruthven subsequently read a lengthy communication that had been received from Mr. J. W. Donovan, of Sunderland, who, after referring to the special features and advantages of his patent stern tube, as described in his communication to the Cardiff centre, said:—"Since writing the above I have been favoured, by the kind permission of Messrs. Charlton & Thompson, managing owners of the steamer *Brantwood*, with the perusal of a letter from the chief engineer, with reference to my improved stern tube after three years' use. He says:—As regards the shafting I had the door of peak tank taken off and thoroughly scraped all dirt and paint off while the engines were running, and saw for myself that shafting and tube were, as far as I could see, in perfect order; in fact the captain also had a look. I then gave shafting a good coat of white paint and particularly in about the part nearest to brass liners, and I may add that the general appearance of the shaft between the liners is a treat to see."

Mr. M'Laren expressed himself as rather disappointed with the remedies recommended by Mr. Aisbitt in the paper, and thought it likely that Mr. Donovan's plan would give the best results. With regard to the troubles arising from chemical action, "Why," he asked, "should we not use nickel steel for propeller shafts?" They would then do away with the brass liners altogether, and work the nickel steel in the white metal. A spare length of nickel steel shaft was fitted in the *City of Paris*, with a tensile strength of about 95,000 lbs., probably 25,000 more than any British or German steel shaft. In a paper which he read before the Institution of Engineers and Shipbuilders in Scotland in March, 1896, Mr. William Beardmore said:—"These experiments proved nickel steel to offer greater resistance to breaking, after being nickled, than carbon steel, but they also prove something else. Whilst the carbon steel broke off short, the fracture of the nickel steel, as in the case of the rivets, was fibrous. From this we may reason that if a crack were to appear, say in a propeller shaft made of nickel steel, it woul not develop so readily as in a shaft forged from carbon steel The importance of this fact to marine engineers is obvious." He had seen it reported that some 1,500 nickel-steel shafts had been fitted in steamers, and two-thirds of these were said to be screw shafts. This showed the progress that was being made and the direction it was taking, but it had not been shown whether or not the usual brass sleeves were fitted. His opinion, however, was that they should be able to dispense with the brass sleeves altogether and work in the white metal.

Mr. J. E. Elmslie, in the course of a lengthy communication, the reading of which was followed with much interest, said:—The failure and breakage of shafting is a matter of the first importance to the seagoing members of this institution, for though the losses and delays caused by the failures of shafting are undoubtedly serious to owners and underwriters, still the owner is to a large extent covered by insurance, and the underwriters should by this time have adjusted their premiums to fit the case. The seagoing engineer, however, frequently goes with his shaft. Of late years the failure and breakage of shafting has been so frequent as to rather suggest that there is a screw loose somewhere, viz., that the failures are due to preventable rather than to accidental causes. Mr. Wm. Beardmore, in a paper on nickel steel, read before the Institution of Naval Architects last April, gave from a then recent return made by Lloyd's the following rather startling figures:—That during the previous two years 1,506 new shafts of all kinds had been made at the principal ports for old classed vessels. Of the 1,506 shafts mentioned, about two-thirds were screw shafts, 400 were crank shafts, and 100 were thrust or intermediate shafts, giving an average of about 125 in two months, and that, taking the many new shafts fitted in foreign ports, the average number was probably 140 to 150 per two months. As a result of this state of things Lloyd's Register issued a circular letter to the Forge Masters calling attention to the frequent failures of shafting, and asking them to explain their views of the matter. With what

result I don't know. Perhaps some other member can give us some information as to the result of this inquiry. Though, probably, in the majority of cases the failures are due principally to some defect of the shafting, or the corrosion of the shafting round the fore end of the after liner, the defect principally dealt with by Mr. Aisbitt, my opinion is that a large amount of the failures are as much due to the ship in which the shafts are placed as to any other cause. In the present day the shipowner requires the utmost deadweight that can be carried on given dimensions, in the cheapest possible ship that can be produced, with the result that—1st, All weights of hull are cut down to the last pound; and, 2nd, the form of hull is such that seagoing qualities in anything more that moderate weather are of a very second-class order. The effect of the first is that you have a rigid shaft of great length, subject to a large amount of vibration, with a heavy propeller on the unsupported end of the shaft. You thus produce something very like what is commonly called the fatigue test in a testing laboratory. In addition to which the vibration rapidly deteriorates the quality of the steel, causing it to become crystalline. The effect of the second, viz., the form of the ship, is that in bad weather these vessels are almost unmanageable. In steaming against a head sea the tremor caused by the seas striking the ship and the racing of the propeller must throw very great strains on the shafting. No doubt, in all cases of failures the shafts have been made to the dimensions required by the rules laid down by the Board of Trade or Lloyd's Register, which Mr. Macfarlane Gray has reminded us are "minimum" dimensions, but everybody knows that owners and builders of cargo tramps seldom exceed the requirements of either the Board of Trade or Lloyd's Register. Also it must be recollected that the rules for the dimensions of shafting laid down by the Board of Trade and Lloyd's Register were calculated for a normal condition of things, and not for the condition of things you get with a big tramp making a sea voyage, in water ballast, in bad weather, with a heavy cast-iron propeller of large diameter only partially immersed on the end of it, which is doing its best to shake everything to pieces, including the shafting. You get stresses that the rules for the dimensions of shafting were never intended to allow for, and which no rules can ever calculate. Now, do we find the same condition of shaft failures all round? I think not. Last July Mr. Manuel read a paper on "Crank and other Shafts used in the Mercantile Marine," before the International Congress of Naval Architects and Marine Engineers. He stated that in the P. and O. Co. from 1880 they had used mild steel shafting, the percentage of strength above Board of Trade rules being in 1881 24 per cent., 1887 14 per cent., 1892 11 per cent., 1897 6 per cent.; and he summed up his experience as follows:—"After an experience of 16 years, I have neither flaws nor breakages to report, while gradually reducing the margin of safety of these steel shafts from 24 per cent. to 6 per cent." If we take the leading steamship companies that have passenger trade, we shall find, take them all round, that, though there may have been a broken shaft here and there, the experience of their superintending engineers is not very different from that of Mr. Manuel's, and all these companies now have large cargo steamers. This being so, it seems to me that shipowners have the matter a good deal in their own hands. That to a large extent the failures of shafts are due to the competition to get the cheapest possible ships, as regards first cost, that can be produced, with weight cut down to the lowest possible point, and which are not constructed with due regard to the work they have to perform. If they were, we should hear less of shaft failures. As regards shafting, nickel steel would be superior to anything else. It is a very reliable material, and while possessing a higher tensile strength than mild steel, about 40 tons, it also possesses increased ductility and toughness, and should a crack appear it will not develop as in carbon steel. As compared with wrought-iron or mild steel it is nearly incorrodible; and while steel shafting once cracked may break short off, the nickel steel is fibrous, and tears gradually.

Mr. McLachlan thought it an objection to Mr. Donovan's system that it would diminish the water ballast tank capacity. He considered steel shafting most objectionable unless it was nickel steel. There was one thought that had occurred to him as a possible explanation of the trouble in propeller shafts, which he had never yet seen mooted, and that was that in a ship sailing from north to south, or from south to north—whether the magnetic action which took place in the shaft due to the hammering had anything to do with the separation of the molecules in the steel shaft to a greater extent than in iron. It might appear to be a strange idea, but perhaps there might be something in it.

The Chairman mentioned the case of a propeller shaft which was covered right through the whole extent of the stern tube with brass. The brass running in the water between the bearings got incrusted with scale, and when they attempted to draw the propeller shaft they were altogether unable to get it out without drawing the stern-tube as well. That was the great danger involved in wrapping the shaft with marline. The case he had mentioned was that of a shaft which had been enclosed from end to end with brass, and owing to the incrustation formed between the bearings they had to draw the stern-tube before they could get the shaft out.

Mr. Scobie said he remembered an instance of a shaft which was iron right through, without any brass at all, but when they attempted to draw it they were unable to do so. They drew it out a foot or so, but then it stuck, and they were unable to get it backwards or forwards. They then bored small holes through the stern tube, and poured vitriol through the holes to soften the rust, and in the result it took them ten days to get that shaft out. The shaft had been running previously for about 12 months. This experience occurred some years ago, when they did not put brass on all small shafts, but made them iron all through.

Mr. C. Noble said that many defects and failures of propeller shafts were due to the construction of the hulls of steamers. One particular case came under his notice when fitting a new propeller shaft in one of the Western Ocean steamers. This propeller shaft had a collar on the fore part of the bearing, between the collar and the face part of the bearing. The old shaft had an inch and a quarter clearance, and the new 7-8th in. The chief engineer, on examining it, said he should have to shift the bearing further aft, or else the shaft would shift it for him during the voyage. He (Mr. Noble) remarked that it was impossible for the working heat at each bearing to expand the shaft to that extent, but the chief engineer said it was entirely due to the structure of the vessel, which changed so much with the nature of the cargo carried, that the friction of the collar on the fore end of the bearing was so great at times that it often heated up. If the hull of a ship changed so much under ordinary circumstances, what must the effect be, on shafting, with a ship of that description in a heavy sea? When they considered the severe conditions under which shafting had to work, firstly, from the varying stresses which occurred through racing; secondly, the bending strain caused by the pressure on the different parts of the hull; thirdly, the twisting strain due to suddenly stopping and reversing the engines, together with bad material and a certain amount of carelessness—it was perhaps surprising with shafts working under these conditions that the percentage of breakdowns was so small. A propeller shaft carefully sheathed with gun-metal of proper size, and made of best iron, seldom gave trouble. With regard to corrosion or water marks, he remembered seeing a very bad defect, found abaft the gun-metal liner in front of the propeller, to the extent of 5-8th in. deep, 5-16th in. broad at surface, tapered down all round the shaft, as if it had been cut with a tool. He would say that such a defect was due to chemical action assisted by the rotation of the shaft. He had never noticed chemical action to any extent take place when zinc plates had been fitted near the parts which were likely to be affected.

The Chairman, alluding to Mr. Elmslie's remarks as to the Board of Trade rules prescribing the minimum dimensions, said he was afraid that those minimum dimensions were generally adopted so far as possible, but in most large steamship companies he thought the practice was to have the shafting 10 per cent. stronger than prescribed by the Board of Trade rules. Mr. M'Laren had suggested running nickel steel in white metal, but the question arose as to how far white metal and nickel steel would work together in salt water.

Mr Ruthven said that in view of Mr. Manuel's experience that a strength of from 6 to 10 per cent. above the Board of Trade minimum furnished a proper margin of safety, he thought it should be possible to whisper to the Board of Trade to increase the minimum to that extent, so that everybody should stand on the same footing, instead of penalising large steamship companies. Let the Board of Trade rules provide for a safe minimum, so that shafts would not break in such large numbers as they did now. Another point that occurred to him was the

additional strain that was thrown upon shafts, owing to the very powerful reversing gear now used. If any practical result was to come from this paper, he thought they should be prepared to suggest to the Board of Trade that the minimum should be raised to such a standard as, in the experience of Mr. Manuel and others, furnished a safe margin.

The Chairman: Do I understand Mr. Ruthven to propose that we shall approach the Board of Trade on the subject?

Mr. Ruthven: I leave that to others who understand these things, but I have no doubt that if we did whisper something of that kind to the Board of Trade it would have some effect.

Mr. M'Laren, replying to Mr. Adamson's inquiry as to whether white metal and nickel steel would work together in salt water, related his experience with four rudder pintles into which they ran white metal. The ship thus fitted made a voyage from Rio to the United Kingdom, the run occupying thirty-eight days, at the end of which time these pintles were found as fresh as when the white metal was put in.

The Chairman said he had been reminded in the course of this discussion of a steamer that came under his notice some years ago. This vessel had come across the Bay of Biscay with the whole of the lignum vitæ out of the after-end bearing, and when they tried to wedge in the stern tube in the ordinary way there was found to be a clearance of an inch and a quarter all round. In other words, the propeller shaft had been working in that ship from the Bay of Biscay right home with a clearance of one and a quarter inches all round. The shaft, however, came out all right, and did not appear to have suffered much from the infliction.

The discussion was continued by Mr. Ackland, Mr. Mather, Mr. Noble, and others, and the meeting concluded with a hearty vote of thanks to the chairman for presiding.

THE ELECTROTHERM.

AMONGST the latest novelties in electrical invention is the Electrotherm supplied by the Edison & Swan United Electric Light Co., Limited, which consists of a pad or sheet heated by an electric current, and which may be used as a portable warmer wherever an electric current is available, or may be carried about the person under the clothes, or may be made up specially in the form of jackets or suits.

At first sight the applicability of this invention for use at sea may not be obvious, as its employment is still so novel, but now that the use of the electric

current for lighting purposes is so common on board all passenger vessels, the applicability of these heating pads is easy, and upon reflection it may be seen what a boon it might prove in cold weather to passengers or even to the executive staff alike.

All state-rooms are now provided with the electric light and available lamp sockets. The electrotherm may be readily attached by a connecting wire of any length to a lamp socket as shown, and immediately a warming pad of any desired heat is obtained, which might be of great comfort to those troubled with chilliness or cold feet. For medical assistance in cases of rheumatism, neuralgia, pneumonia, bronchial or bowel complaints its application would be of immense value, as it can be at once applied by the patient without assistance, and maintains a uniform and desired temperature as long as may be desired. Where passengers desire to sit on deck in sharp weather to enjoy the air, this might be done by the chilliest mortal with perfect comfort, if the heat to the extremities or body were maintained by the use of such an electrotherm. Where the members of the executive staff might have a bitter watch upon the bridge or forecastle exposed to the inclemencies of wintry weather, such a comforter under the feet or about the person might not be despised.

The electrotherm is composed of wires insulated and protected by asbestos woven into a light and flexible sheet or pad, which when attached to the ordinary incandescent lamp socket offers sufficient resistance to the current to produce a constant and uniform degree of heat. It is provided with a regulating switch which furnishes a simple and convenient method of regulation. The key in this switch is arrow-shaped, so that it may be manipulated in the dark, and may be turned to four alternative positions, 0, 1, 2 and 3. At 0 the current is off; in the positions 1 to 3 the current is on, and the pad will be heated with more or less intensity.

The electrotherms can thus be maintained at approximately 130, 160 and 200 degs. Fahr. respectively, when covered with ordinary bed or other clothing, but these temperatures may be modified to any degree by the interposition of blankets, &c. Excessive heating is checked and controlled by a thermostat.

For travellers by land or sea, wherever the benefits of civilisation may be obtained in the shape of an electric current, this electrotherm would appear to be a great boon.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The White Star Line

Has taken a step which will probably have a considerable effect on the hours of business in Liverpool shipping circles. Their new offices, magnificent though they be, do not seem to have overwhelming attractions for their staff, and on January 29th, in pursuance of a notice previously distributed, the offices were closed for business at one o'clock, and this will be hereafter the practice every Saturday. What the White Star Company does to-day other Liverpool offices are apt to do to-morrow, and we shall thus see that in Liverpool Saturday will tend to become as much a *dies non* as it has already become in London, where business men only seem to go down on that morning, if at all, for the purpose of reading their letters, and where it must be urgent business indeed that excuses one from calling on a business man that day.

The West India and Pacific Steam Navigation Company

has issued its accounts for the year 1897, and a very satisfactory statement it seems. The fleet has undergone no change; there have been neither additions nor removals. But, of course, it is a year older, and so the sum of £60,000 has been set aside for depreciation. As the vessels' tonnage totals up to 70,587 tons gross register, this amounts to a reduction of about 18s. per ton. Last year it stood at £7 14s. 9d., so now it is reduced to about £6 16s. 6d. Not only has this been done, but the insurance fund has been increased by upwards of £11,000, and now stands at the respect-

able sum of £127,000. The 10 per cent. dividend has been maintained, and the directors of the company seem to intend that it shall—as far as lies in their power—be kept at that figure, for they have carried to reserve, as a provision against a rainy day, another sum of £25,000. The fleet will shortly be increased by the addition of two fine steamers of 5,500 tons each, which are now under construction for the company by Messrs. Caird & Co., of Greenock. We are not told in the report what type of vessel these will be, but in view of the numerous recent breakdowns of large steamships in the Atlantic, we can hardly suppose that so enlightened a board will trust to a single set of engines in their new ships. I may add that these vessels are to be named *Colombian* and *Antillean*. The whole state of the line seems to be thoroughly satisfactory, and it is the more interesting to note the fact when we remember that the concern is so largely bound up with the West Indies, whose trade is so depressed, and whose condition has called for a Royal Commission and for Imperial assistance. True, the West India and Pacific Company has the assistance of its New Orleans trade, but it could not do as well as it has done unless every branch of its operations were conducted at a profit.

The Nederlands American Line

has suffered a heavy loss by the foundering, on her outward voyage, of their fine steamship *Veendam* in the North Atlantic, by one of those unfortunate accidents which befall the best and finest vessels which the wit of man can devise. No blame can be attached to builders, managers or navigators for these catastrophes. Now that a mail steamer has been lost by the striking of sunken wreckage, there may be some hope that serious attention may be turned to the dangers which vessels of all classes run through the existence of these floating derelicts which no look-out can observe. Their danger is greater in proportion to the speed of the vessel which encounters them, and if a vessel of the type which holds the record to-day had been the victim, instead of the *Veendam*, the tale might have been a much more distressing one. Thanks to the coming along of the American Liner *S. Louis*, also westward bound, and to the excellent discipline observed on the sinking steamer, no loss of life has to be deplored. But the boat service was an especially arduous one, as the work had to be effected in a heavy sea, and during the hours of darkness. Every credit must therefore be rendered to all concerned, whether they be the gallant Dutchmen of the *Veendam's* crew or the rescuing Americans of the *S. Louis*.

The *Veendam* is, of course, much better known to my readers as the old White Star boat *Baltic*. Under her original name she broke the Atlantic record, and for very many years was one of the most favourite vessels in the North Atlantic trade. When she was sold out of the service she was purchased by the Nederlands Company, and given new boilers and triple-expansion engines in place of the old tandem compound engines which the early Harland & Wolff boats affected. She had six bulkheads, and was therefore very efficiently subdivided for the date at the which she was built.

It would, of course, have been impossible for the Daily Press to have missed such an opportunity for showing its ignorance of maritime affairs. Yet the person who was responsible for the telegram which brought the first announcement of this disaster to England really broke the record in this regard. He said "As she (that is the *Veendam*) will prove a dangerous obstruction to navigation, note was taken of her position which was then lat. 49° 19′ N., long 19° 49′ W." Now as he had already told us that the vessel was settling down rapidly by the stern, and as the masters of the two vessels showed by their action in transferring the ship's complement during the hours of darkness, the founding of the vessel must have been only a question of minutes. Iron steamers with general cargoes are not wont to become waterlogged and float, as the wreckage which so fatally wounded the *Veendam* did, at or just below the surface. So if any meaning has to be attached to the remark about the wreck constituting a "dangerous obstruction" it must relate to the possibility of her upper works, when she had finally found a resting-place at the bottom of the Atlantic, forming a danger to passing ships. But the position given is not even on the banks of Newfoundland. It is in the deep valley which lies to the west of the Irish coast—in fact, it is in the deepest part of the Atlantic. A reference to the chart shows that 12,000 ft., or nearly 2¼ miles, is the least depth found in the neighbourhood indicated. The poor *Veendam* is not likely therefore to prove much of an anxiety to future navigators, or even to any but this most maginative writer.

The Atlantic Passenger Trade

during the year 1897 showed a considerable falling off in numbers carried, though it may not have been a bad year for the pockets of those who are shareholders in the liners. Rates were well maintained, though passengers were comparatively few, and opportunities for passages exceptionally frequent. Just to particularise for a moment. The number of trips made in 1897 was 901 against 853 in the previous year. Thirty lines contributed to these trips, whilst in 1896 only 23 despatched vessels. Of course many of those which go to swell the total did not make more than an occasional excursion. But, all included, only 282,936 passengers entered the ports of New York. And the falling off is noticeable as well in saloon as in emigrant passengers. But 192,000 emigrants were carried. This is about 60,000 less than in 1896, and only beats the total of one recent year. That was 1894, when 188,164 were carried. The White Star and Cunard lines do not seem to have suffered as severely as some foreign lines. The former's total of 17,303 emigrants in 1897 is about 3,300 lower than their total in the previous year, whilst the White Star's figure of 19,271 passengers in this class is just under 2,000 less than that of 1896. The American Line shows a falling of about 1,500 with a figure 11,322. But North German Lloyd has fallen from 38,000 to 24,500, and Hamburg-American from 32,280 to 15,270. This latter is a reduction of upwards of 50 per cent. The French Transatlantique Line also shows a diminution, its 1896 total of 17,371 having fallen to 14,264 in 1897.

In the cabin department various factors have been at work. The comfortable moderate-speed vessels put on by the North German Lloyd Company have increased the company's sailings though they may not have increased the average of saloon passengers carried per bottom. For as these ships can carry large quantities of goods they can run profitably with a smaller passenger list than the mail steamers. This remark also applies to the saloon passenger trade of the Atlantic Transport Company in their fine cargo vessels from the Thames. With these factors in view we can better appreciate the value of the figures published. Cunard's carried 17,989 cabin passengers in 1896, and but 15,196 in 1897. White Star are down 1,500, with a total of 10,104. The American Line with 14,443 show a diminution of 2,400. The Transatlantique Line is 800 down with a figure of 6,044. Hamburg-American with 10,556 are 1,600 down on their Southampton Line; whilst North German Lloyd, on the same branch of their trade, are exceptionally 1,700 up.

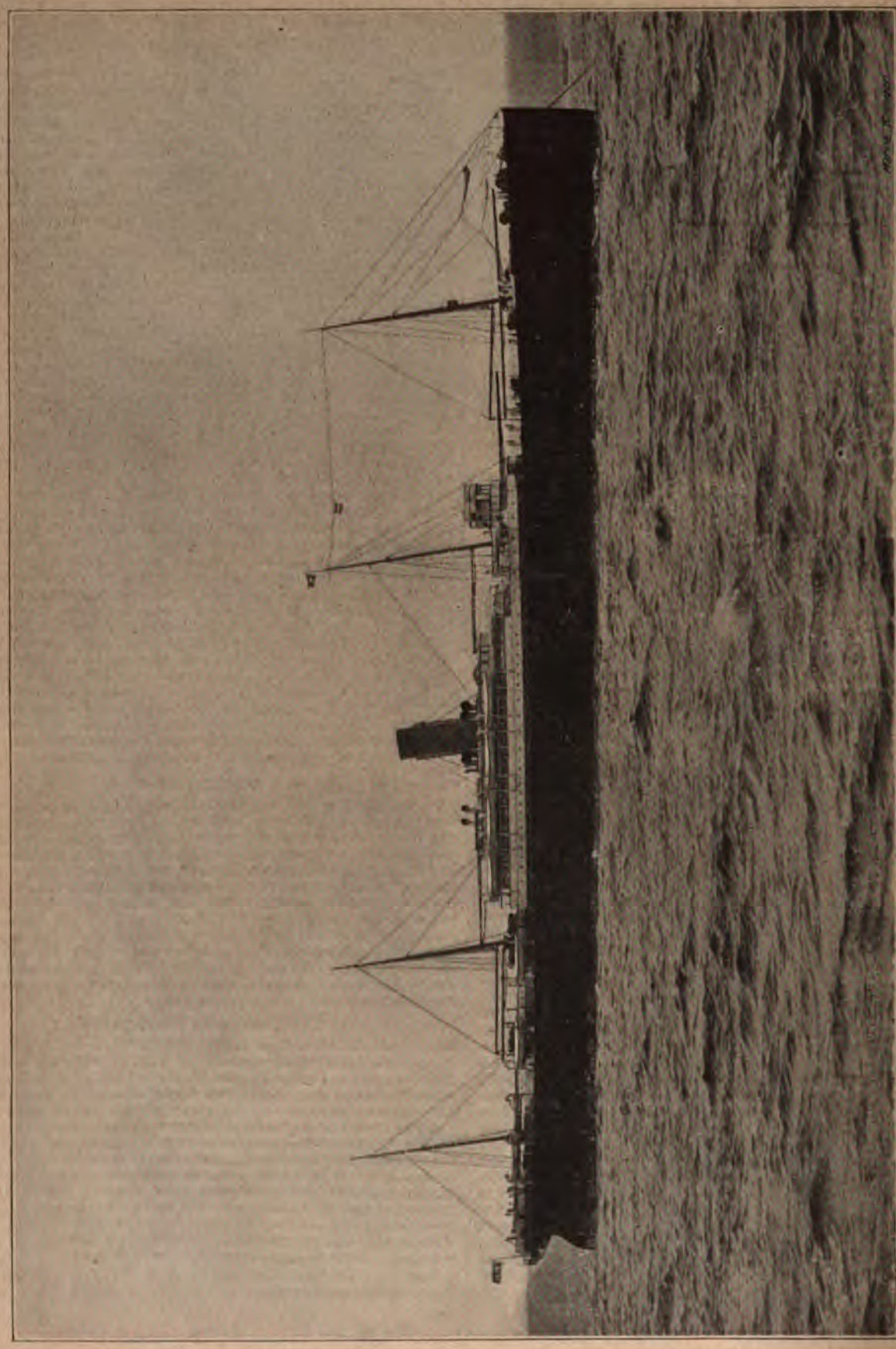
Messrs. C. W. Kellock & Co.

have been dealing with large and important vessels lately. It was through them that the Canadian Pacific Railroad purchased the Union liners *Tartar* and *Athenian*, and more recently they have disposed of the big cargo vessel *Samoa*, which is described as the biggest vessel, except the *Great Eastern*, which ever changed hands. The reservation makes little difference to the brokers, for they can claim they have successfully dealt with the departed leviathan. The *Samoa*, which was formerly owned by Messrs. Crow, Rudolph & Co., of Liverpool, is an interesting and important vessel, as she was the first of the big cargo steamers which are so characteristic as the present day. She is, however, of course surpassed by many vessels now, including the same owner's steamship *Algoa*.

The Messageries Maritime

despatched their new liner *Indus* from La Ciotat on the 9th for Marseilles, where she was sent out to undergo her trials on the 19th February. I have not yet details of these trials to hand. She is booked to make her first sailing to India and China on the 13th March. She is a very fine vessel, though not as large as the big P. & O. boats, being but 6,000 tons gross measurement. Her H.P., however, is estimated at 7·200 indicated, and her designed speed is 18½ knots, *not* statute miles. I say not statute miles, because the P. & O. Company has recently been rather inclined to take miles as its standard, and miles show in a somewhat favourable light when compared with knots. I fancy, with her twin screws and her French cuisine, she will be a formidable rival to the best of Sir Thomas Sutherland's new ships. Of course she is outrageously subsidised. But so is——

I am sorry I did not check myself sooner, but it is a very sad thing for this country that the P. & O. is the one company that



THE WHITE STAR CO.'S S.S. "OCEANIC," BUILT AND ENGINED BY MESSRS. HARLAND & WOLFF, LTD., BELFAST. (See pages 459 and 472.)

gets a fairly adequate subsidy. And that it is the one company of the great Mail lines that causes grumbles and growls as to its fares and its ships and its speed. One sees the inadequacy of the Mail payments for the really fast Atlantic services. One sees the rapid diminution of the really fast vessels—reckoning by to-day's standard of speed—which our Mercantile Marine possesses, and one realises that we are, relatively at all events, going back as a national owner of the class of ship which would be to us of incalculable value in time of war. Yet we cannot press our arguments home because the one properly subsidised line stands high indeed on the Stock Exchange, but is beaten in facilities afforded by the unsubsidised Bibby Line at home, and seriously threatened—to say the least—by the Messageries, and even by the Austro-Hungarian Lloyd Company, abroad.

The British India Company

has had its services interrupted by a strike amongst its senior navigating officers. There have for a long time been rumours of dissatisfaction amongst the deck officers of this line. They allege under-pay and under position. They say that the company's vessels are navigated by temporary commanders with merely acting rank, and with merely a nominal increase over their chief officer's pay. Occasional cases of this kind may well happen in a big line trading between distant colonial ports. But the case against the shipowners is that the thing is the rule rather than the exception. At all events the officers thought the matter serious enough to strike about it, and the deck officers of steamers nowadays seem—at least when they are in home waters—the last people in the world to turn at any treatment. They seem to feel so acutely the competition in their profession that they dread to give any of their fellows a chance to underbid them. So there may be a kind of presumption that there is something substantial in the complaints put forward. But it is too soon to discuss the matter. We must wait for fuller information. All we can say now is that the strike is over, and matters are—at least temporarily—settled. But the marine engineer will be well advised to watch what is passing on deck in this regard. For if the shipmaster suffers the marine engineer may be enduring the same experience in a little while.

The White Star Line.

During the month of February I had the opportunity of inspecting the new offices of the White Star Line, to which allusion has already been made in this column. The steamship company's own dwelling-place seems quite finished. But the upper floors, which are to be tenanted by other firms, are not yet completed, plastering and decoration being still to be done. The staircase too—and a long one it is—has not yet received its lining of polished stone. But it is quite possible to describe the place now. I will not repeat what has been said on former occasions, but will merely notice what particularly struck me. The line has the ground floor and basement for offices, and a board room upstairs, and will also use the sub-basement for storage purposes, &c. On this lowest level, too, are the boilers, which I see are of a water-tube type. On the upper basement are the offices for the three classes of passengers. Owing to the falling away of the ground towards the bottom of James Street, it has been possible to give these apartments entrance from the street, and they are only basements in name. The arrangements here are most complete. On the same floors are captain's room, and the accommodation for the lady typists. The main feature of the place, however, is, of course, the general office. It is so spacious and lofty that on entering it one seems to be advancing into a spacious hall with some excellent sea pieces by Mr. Wyllie on the walls, and a magnificent, if tiny, model of a steamship in the centre. But the tininess of the model—which, by the way, represents the *Teutonic* with her guns in place—is only by comparison with the great hall in which it stands. One then begins to notice that behind the dwarf screens, formed by a highly polished stone counter surmounted by a ground-glass top, are the various departments of the great steamship business. The arrangements here are very complete. At the far end of the hall are the rooms for the partners in the firm. These have an outlook towards the landing stage, though they do not really show much beyond the line of the overhead railway, and the little garden which has replaced the old cart stand. The peculiarity of the great office is chiefly shown in three matters. First the entire absence of any gilding or other ornamentation of a similar sort; second, the style of the ceiling, composed of narrow terra cotta arches set in girders; and third, the plain square pillars painted in a dead colour. The latter are most striking, and remind one of the main girders of a ship. Strength and solidity are typified here.

The "Cymric."

Unfortunately for me the *Cymric* had sailed on her first trip the day before I got down. But I had an excellent description of her. Most of what can be told has already been published. Her huge capacity and vast dimensions are not her only claims to notice. Her high boiler pressure—210 lbs.—promises great economy in coal consumption, especially as it is used in conjunction with the quadruple-expansion type of engine. Then she has, for the first time amongst White Star cargo boats, passenger accommodation. There is room for no less than 100 saloon passengers. No other class are carried. The possible hundred will have a very good time. They will be conveyed at a speed equal to, or even exceeding, that of the record breaker of a quarter of a century ago, but they will have luxuries beyond the wildest dreams of the travellers of a much more recent date. The vessel herself exceeds in size not only the White Star Mail boats, but also everything afloat except the big Cunarders (which she is only a trifling amount behind) and the newest North German boat. Thus there should be great steadiness at sea, especially as she is fitted with bilge keels. The saloon accommodation is modelled on the plan of the *Majestic* and *Teutonic*. But there is one difference. Owing to the limited numbers carried and the great beam of the ship, the state-rooms can be made larger, and the conveniences of wardrobes and chests of drawers are afforded. It will be interesting to note how far the facilities provided are appreciated by the public. If the idea is popular we may be sure we shall see a *Cymric* despatched every week for New York by the company before we are much older. In this connection I may mention that the other cargo boats of the line are now being fitted with bilge keels to minimise rolling.

La Compagnie Generale Transatlantique

have had another very serious misfortune. Their steamship *Flachat* went ashore in fog at Anagra Point, Teneriffe, in the early morning of the 16th February, and broke in two. The loss of life exceeds that on board the unfortunate *Ville de S. Nazaire*, which was lost last year. The *Flachat* was not a very extraordinary ship in any way. She was built in 1881 by Mr. M. Pearce, of Stockton. She was 300 ft. long, and 2,175 tons gross register. She was built before the days when steel came into general use for shipbuilding, and her engines were of the compound type.

The North German Lloyd Company

seems likely to reap benefit from the "spirited policy" which has taken root in the mind of the Kaiser. There seems every probability that there will be inducements afforded to the line to double its sailings—now made four-weekly—to the East and South. But I must leave discussion of this programme till we see its nearer fulfilment.

The Fast Canadian Service

still hangs fire badly, and nothing has been heard lately of it. The beginnings of its flyers would be as difficult to find in the shipyards of the United Kingdom as appear to be the keels of those new Manx boats of which the London correspondent of a daily shipping paper was telling the other day.

Publications.

The Castle Company have published an excellent roller map to South Africa. It comes at a price which should place it within the reach of everyone, and to nearly everyone it will be invaluable. For nearly everyone, nowadays, is interested in South Africa and its geography, political and mining. The places are clearly marked, and their names very numerous.

The same company has also issued an illustrated handbook to the South African goldfields. This affords a great deal of useful information as to climate, prices, mode of life, and suchlike matters in South Africa. It also has a good deal to say on methods of communication and the best means of reaching this land of Ophir. But it further has a very comprehensive account of the history and present condition of the gold mining industry. The methods pursued for recovering the gold, with the percentages attained, the improvements made recently, and probable within the immediate future, are all set out, as are the political conditions, and the effects that their development, and the consequent changes in the economic conditions of the mining

regions, are likely to have upon the fortunes of those who go to the diggings. From all one can see, the prospects here are fully as bright as those of Klondike, whilst the mining regions are more accessible, the climate more equable, and the hardships much more endurable. But the patient afflicted with gold-fever seems, at the moment, to turn naturally to Klondike, and argument and reason seem to have little effect. But a reaction will soon come, and the gold output of South Africa, already so high, will be further increased.

An Old Cunarder

Some little time ago I was fortunate enough to get a snapshot at the steamship *British Queen* in the Irish Channel. As this vessel is the patriarch of the Cunard Fleet and is one of the oldest steamships in regular work in the over-sea trade. She dates from the year 1849 and will therefore celebrate her jubilee next year. The fact that she is running, and running frequently and regularly, speaks volumes not only for the workmanship which was put into her by her builders—the well-known firm of Denny & Co., of Dumbarton—but also for the thorough manner in which the Cunard Line keeps up its vessels. The vessel is of what is now-a-days a trifling size. The gross tonnage is but 732 tons, whilst her net register is 435 tons. Her

length is 195 ft. between perpendiculars, and her beam 29 ft. For many years she has helped to maintain the Cunard service between Liverpool and Havre. But in former times she has crossed the Atlantic—not, of course, in the Mail Line, but for the purpose of working in one of the services which the company in former days maintained in North American waters. I may add that her original machinery was, in 1878, replaced by a pair of compound engines by the Liverpool firm of Messrs. J. Jack, Rollo & Co. There would appear no reason why the staunch old craft should not long continue at her work for the premier Atlantic company.

The Castle Company

continue to add fresh and fresh tonnage to their already modern fleet. The *Carisbrooke Castle*, as I have already stated, is launched, and will be ready to take her place in the Mail service early in May. She, fine and large though she be, by no means represents finality, or even the present standard of what Messrs. Donald Currie & Co. intend to aim at in their provision for the requirements of their passenger and Mail services. The Fairfield Co., which is now busy completing her, has just obtained an order from the Castle Company for two other mail steamers of a tonnage exceeding 9,000 gross. These vessels will be upwards of 500 ft. in length, and will, of course, show the latest improvements in luxury and convenience which Messrs. Donald Currie's accumulated experience can suggest.

Meanwhile, for the intermediate service of the line, Messrs. Barclay, Curle & Co., of Glasgow, have launched, on the 23rd February, a large steel steamship which distinctly marks an advance on her predecessors of her class. She is called the *Braemar Castle*, and is of about 6,200 tons gross. The length on the water line is 450 ft., with 52 ft. 3 in. beam, and a moulded depth of 33 ft. 6 in. She will be fitted with quadruple-expansion engines, balanced on the Yarrow-Tweedy-Schlick system, and capable of maintaining a higher rate of speed than that which has hitherto been found necessary in any of the Castle intermediate vessels. The usual appliances which experience has approved are provided. These include Brown's telemotor for actuating the steering gear, a Napier's capstan, and Hall's refrigerating plant. The precautions against accident are ample. The vessel is built to Lloyd's highest class. She has a cellular double bottom, and her bulkheading is in accordance with the recommendations of the Bulkheads Committee, whilst a double collision bulkhead is provided. She will carry sixteen boats. Provision is made for the carriage of 70 saloon, 130 second class, and 160 steerage passengers, whilst, if desirable, large numbers of emigrants or troops could be accommodated in the 'tween decks. Special attention is paid to the supply of water and air to every part of the ship, and also to the bath and sanitary arrangements. These matters are, of course, especially important in a vessel intended for this trade where the tropics have to be traversed every voyage. Altogether it may be said that the *Braemar Castle* —though an intermediate boat only—will offer passengers advantages which were undreamt of in the finest mail steamers not so many years ago.

THE HELICOID LOCK NUT.

IN the history of mechanics there can be little doubt that the subject of lock nuts has been dealt with in greater variety than any other simple device which has great utility. For many years past the question of designing an effective lock nut has been the object of a considerable number of persons judging from the extensive variety of designs which from time to time are patented and in some cases put on the market. The large majority of these have been absolute failures, while some have produced such a locking action as to destroy the bolt when the nut is taken off, and others which were fairly efficient have been too costly to admit of wide use in the ordinary way. It may be said generally that a lock nut should have three important characteristics, viz.: that it shall lock absolutely under any reasonable conditions of use, that it can be removed from the bolt and replaced many times without reducing its locking efficiency, and lastly, but not least, that it can be produced at a reasonable cost, so as to command a ready sale as a commercial article.

We have had an opportunity of examining a new lock nut on what is claimed, and we think rightly, an entirely novel principle, which is now being put on the market by the Helicoid Lock Nut Syndicate, Limited, of 147, Dashwood House, New Broad Street, London, E.C., of which Mr. Godfrey J. B. Chetwynd is the managing director.

This lock nut has been through the usual experimental stage and has now entered on its commercial career, which appears to be on a fairly substantial basis, judging from the works at Acton which have been equipped by the syndicate, portions of which are shown in Figs. 1 and 2 of the adjoining illustrations. Fig. 3 is a perpective view of a hexagon nut, Fig. 4 is a view of an ordinary bolt, with a round nut. Fig. 5 shows a special spanner for use upon the rough round nuts, and Fig. 6 is a detail view of the travelling head of the coiling machine used in the manufacture of these nuts.

The method of manufacture adopted is the coiling of a bar or strip of cold steel or other metal upon a mandrel, by means of the coiling machine travelling head shown in Fig. 6.

This machine is in the form of a lathe having a chuck in which the strip is held by a vice or clamping

device, and through the centre of which a long rod passes which forms the mandrel upon which the strip is coiled. This mandrel is also supported by a travelling head or tail stock (Fig. 6), which is mounted on a saddle so as to travel backward on the bed as the coiling goes on; a certain amount of resistance to this backward motion being set up by powerful spring clamps engaging with the bed. It will be seen in Fig. 6 that the coiling head is fitted with an adjustable plane which engages with the strip and bends it closely round the mandrel as the machine rotates. This plane is made of very hard material as the work done by this surface is very considerable due to the heavy strain that is necessary to produce a close coil on the mandrel. It may be noted the coil shown in Fig. 6 is a right-hand helix, and is for a nut with a left-hand screw thread; for a right-hand thread the converse coil is necessary, as by this relationship the lock nut is made more effective. The coiling head has an abutment against which the strip presses as it is being coiled, thus pressing the coils closely upon one another, the necessary resistance being adjusted by the spring clamps on the saddle. The strips, which are about 40 ft. long, when coiled form a tube about 5 ft. long. In order to remove the mandrel when the full length of coil is made, the machine is reversed a few turns, which releases the grip of the coil on the mandrel, and allows it to be withdrawn from the coil. This reversing is caused by the back lash of the metal.

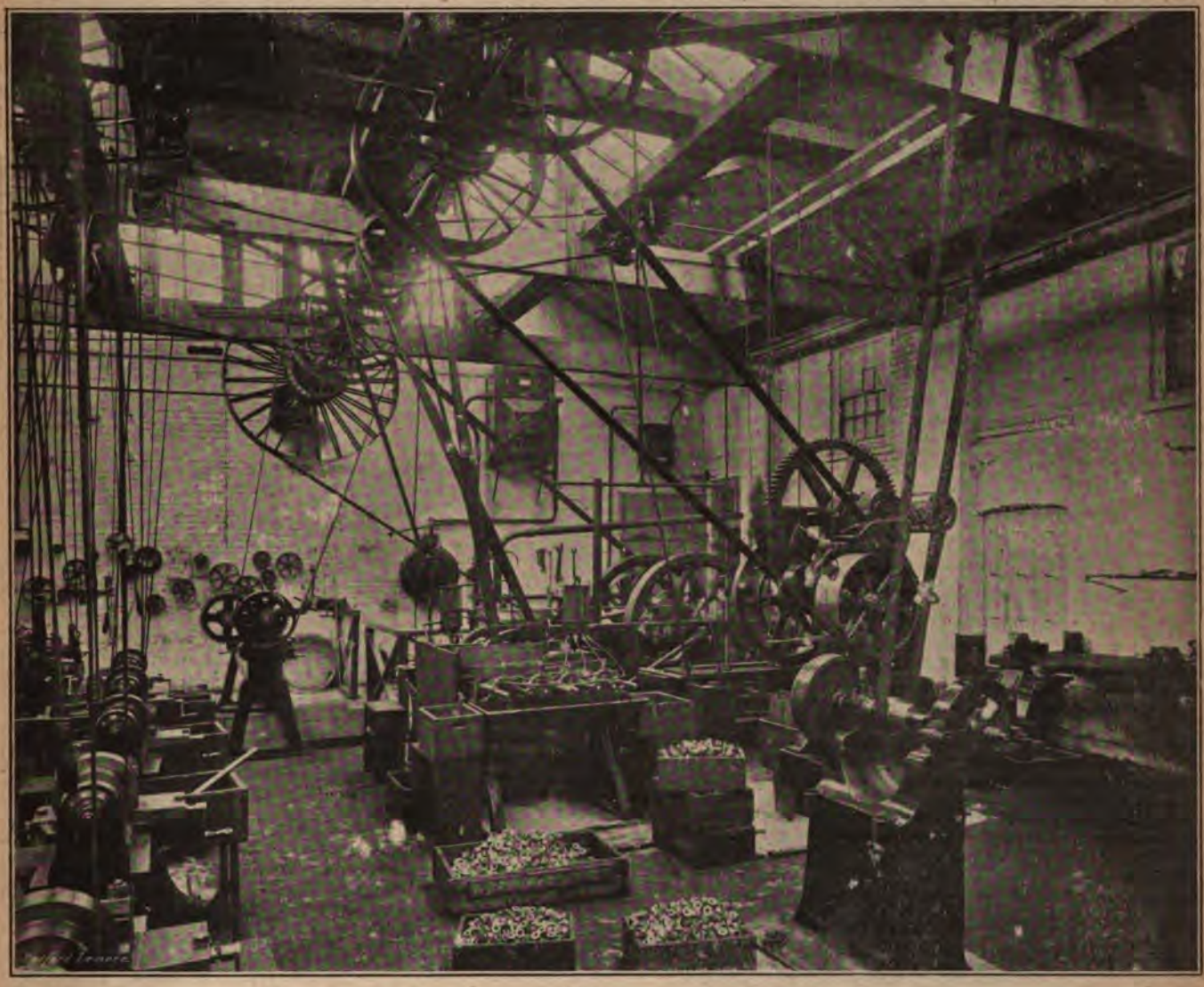


Fig. 1

The strip is made of a special section in order that the resulting coil shall have its convolutions lying closely to one another and the external and internal surfaces shall be fairly straight, which will be seen to be necessary from the following explanation. If a strip of rectangular section be coiled on a mandrel it will be found that by reason of the extension of the external part of the strip and compression of the

internal part due to the bending action, the resulting width is wider on the inside than on the outside of the convolution, so that, while touching on the inside, they would be apart on the outside, to overcome this difficulty the strip is rolled of approximately trapezoidal section so proportioned that when coiled with the narrow width nearest the centre, the section of the convolution is rectangular. Again it will be found that a straight-sided section will, when coiled, have its outside side concave and its inner side convex. To overcome this objectionable feature the strip is made with its outer side convex and inner side concave to such an extent that when coiled these curvatures neutralize one another and leave the section of the resultant coil quite straight.

The coil tube being complete it is sawn up into nuts of suitable length by means of automatic machine-driven hack saws, a large number of which machines are shown in Fig. 2. It is proposed to substitute these reciprocating saws by circular saws at an early date, as these latter are more efficient in action. It will be seen in Fig. 4 that the nuts are circular on the exterior, such being made for railway fish plates or other rough work in which appearance is no object, and a low price is desirable, which would not allow of extra cost being incurred to make the nuts flat-sided.

Fig 2.

To manipulate these round nuts a simple form of grip spanner has been designed, which is illustrated in Fig. 5, and which is of such an obvious construction as to need no further description. The motion of screwing up and slacking back is that of a ratchet, and the operation can be performed with far more facility than when a flat-sided nut and ordinary spanner are used.

After being sawn off the nuts are tapped with a thread which is about $\frac{1}{100}$th of an inch less in diameter than the bolt for which it is intended.

Now, if the nut were solid it would be practically impossible to screw it on to the bolt, but the helical construction permits the nut to spring outward and expand, which function gives the nut its locking

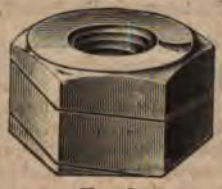


Fig. 3.

power, as the natural spring of the metal causes it always to grip the bolt. In screwing the nut on it is desirable to let the spanner engage the bottom portion of the nut and in slacking back the upper portion, as such engagement tends to open the coil and reduce the frictional adhesion.

For hexagon and other flat-sided nuts, the nuts are shaped in a powerful shearing press. In the case of a hexagon nut, six knives or shear blades are fitted to the reciprocating head of the press, and a round nut is fed into position; when the knives ascend they shear off arcs of circles from the round nut and thus form flat sides. The head is made hollow and the nuts, after shearing, pass up there through. Another point in the machine is an important feature as it ensures a clean cut. The head is arranged in its travel to shear down only half-way down the nut at the first stroke, taking the nut up with it; on the next down stroke another nut is fed under it which forms an anvil, when the knives finish shearing the first nut and shear the second nut half-way down, and so on; each nut as it is sheared being pushed up into the head and finally delivered from the top into a suitable receptacle.

The nuts are finally finished in the usual way, on lathes, emery wheels, polishing laps, and other machines of known construction, according to the finish desired. It will be seen that the process has been perfected to its commercial form, and we under-

Fig. 4.

stand that the invention has been in practical use for some two or three years, in some cases in extremely trying circumstances and that up to the present there has been no case of failure. For example, in one instance the nut was used by Messrs. Vickers, Sons & Co., of Sheffield, upon an "Oliver" hammer driven by power, and stood the test in the most satisfactory manner possible. It is difficult to imagine a more trying condition to submit a lock nut to, and its efficiency is emphasized by the fact that, previous to the use of the Helicoid nut, no others could be got to stand on this particular machine.

We have seen copies of letters from the Director of Navy Contracts, Messrs. Vickers & Co.; Marshall, Sons & Co., the Brush Co., some of the leading railway engineers, and many other important persons.

We think that this nut will be appreciated by marine engineers as supplying a want for a simple device which can be absolutely relied on to carry out

Fig. 5.

the object for which it is called into existence. It appears to be particularly applicable to fast-running machinery now so generally used on board ship for many purposes, as any spontaneous slacking back of nuts may create a heavy risk of breakdown.

The advantage of the locking action of the Helicoid nut is very apparent. When an ordinary nut is screwed up tight in position the thread of the nut and bolt are forced into contact on one side only by

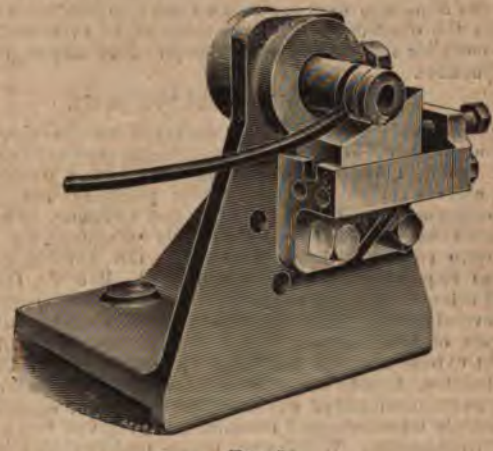


Fig 6.

the pressure of the nut against the surface it abuts upon, it is in fact the action of a circular wedge. If from any cause, such as vibration, the nut slacks back even an infinitesimal extent, it is only a matter of time before it will be worked quite loose, the resistance to slacking growing less and less at each movement. It is for this reason that any ordinary nut will slack back if subjected to vibration long enough. With the Helicoid nut, the threads are jammed together on both pairs of surfaces, and the contact is as close if the nut is slacked back as when it is hard up against an abutment.

Steam Turbine.—The American naval authorities are said to be experimenting with a new steam turbine, which is said to have two radical advantages over the Parsons turbine, chief of which is its ability to reverse. The American machine runs at the speed of 600 revolutions per minute.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our own Correspondent at home and abroad.)

Our Colonies and the Navy.

THE proposal which has been made to the Admiralty from New Zealand, by the chairman of the Harbour Board of Auckland, has caused much discussion and some recrimination in the Press during the past month. No doubt the Admiralty were right when, in their reply to Mr. Napier, in which they considered the scheme impracticable, they said: "That the highly technical character of the necessary training of seamen for Her Majesty's Fleet, of which seamanship now forms only a small part, but which includes as indispensable the handling of every description of modern gun, great and small, and of torpedoes, renders the stationing of an isolated training ship on the shores of a particular colony a very imperfect means of educating crews for men-of-war of the present day." At present there is no lack of boys for the Navy and great numbers are rejected year after year; but, then, if boys trained in colonial waters were permitted to enter the Royal Navy there could be no doubt whatever that it would in the end tend to draw the colonies closer to the mother country, if only because they were taking an active part in the strengthening of the empire. Another means suggested to establish a relationship between the Navy and the colonies is by forming a Naval Reserve recruited in the colonies and periodically trained in the men-of-war on the colonial stations. Canada, too, is said to be about to devote a sum of £50,000 towards the maintenance of a training ship in Canadian waters, and then there is Cape Colony's contribution to Imperial Defence. But whether these offers are accepted or not they all go to show that in time of need we could rely upon the assistance of our colonies, and if the Admiralty were to adopt a more sympathetic attitude towards the overtures which are being made they would be doing more for the defence of the empire than they at present think possible.

Trades Unionism in the Dockyards.

The agitation in the Portsmouth dockyard must be taken as an indication that trades unionism is gaining ground in the public yards. It will be remembered that the trouble commenced when some rivetters were summarily punished for having claimed payment for work which they had not done. The men contended that the custom was partially recognised, and when they were suspended protested against the decision of the Admiral Superintendent to the Admiralty. But Mr. Goschen upheld this official, and the suspended men were discharged along with several others. Mass meetings have been since held and the influence of the local member of Parliament, Sir J. Baker, brought to bear upon the Admiralty with a view to reconsidering their decision. Resolutions were unanimously passed expressing regret at the dismissal of the men and protesting against the Admiralty's interference of the workman's right of free speech and of combination. Well-known labour leaders have joined in the dispute and are doing their best to create ill-feeling between the dockyard employés and the Admiralty. The Parliamentary Committee of the Trades Union Congress asked the First Lord to receive a deputation on the subject, but Mr. Goschen declined, saying that the discharge of the men had nothing to do with trades unions, and that he must decline to allow the interposition of outside agencies in the discipline and management of Her Majesty's dockyards. The Admiralty are quite right in declining to admit of any outside interference with their conduct of the work or workmen in the public yards, for if they were to give in we should be practically dependent on the good faith of trades unions for the proper carrying out of the work therein.

The Navy's Coal Supply.

The excitement attendant on events which have recently taken place in the Far East was accentuated by the report that the British had bought up all the available Welsh coal in that region. It does not follow of course that they have bought up all the coal to be had, for there is a stock of other coal, although it is not exactly the sort that is preferred by foreign Governments. France has some rich coalfields in Tonkin, and the coals which are taken therefrom are said to sell at a good price and to have been favourably reported upon by the captains of our ships in the Far East. Again, in the vicinity of Port Arthur and Kiao Chau, the place occupied by the Germans, China has some excellent beds, but, unfortunately, like everything else in China, the coal is of little practical value and use for want of money wherewith to buy machinery to work the beds. But happily we do not leave the buying of coal for our squadrons in the Far East to chance, and it is to be hoped that we shall never be in the position in which the German and Russian ships found themselves recently, when they could only get coal through the courtesy of others.

Portsmouth Dockyard.

The trials of the *Diadem* and the agitation resulting from the dismissal of some rivetters from this yard have been the chief topics of interest in the past month. As regards the first, the trials have shown that the *Diadem* is about the most economical coal-consuming vessel we have. Her trials are no doubt satisfactory from an official point of view, but it is questionable whether a commerce-protector should not have a greater speed than a little more than 20 knots, in view of the 22 and 23 knots which several vessels built and building for foreign navies are to steam at. As for the men over whom such a rumpus is being made, there is no doubt that they did wrong, and that the best thing for them to have done would have been to throw themselves on the mercy of the Admiralty instead of threatening and bullying. It is stated here that the *Iris* is to be sent as a drill ship to Liverpool in place of the *Eagle*, for the Royal Naval Reserve, and that the *Mercury*, a sister ship, will carry out the same duty at Bristol. The *Cæsar* has developed several defects in her gun mountings which are being put to rights, and the Royal yacht *Osborne* is here undergoing an overhaul. The *Crescent*, too, is to be taken in hand, and is ordered to be ready for service by the end of May next. Another important item of news is that a large consignment of material from Glasgow has arrived here, for which we ought to be thankful, and with it were the keel plates for the *Formidable* and a number of armour plates for the *Canopus*, which vessel, up to date, has had something like 6,000 tons built into her. She is making fair progress. The *Pandora*, too, will profit by the shipment, for with it came plates, etc., for her, and although she has been somewhat delayed by the engineering dispute, it is hoped that she will soon make up the lost ground. During the second contract trials of the *Violet*, torpedo-boat destroyer, in which she was required to maintain a speed of 30 knots for three hours, some of her bearings became overheated, and after an hour and a half the trial had to be abandoned, although she kept up the required speed for that time. Preparations are in progress for the laying down of the keel of the *Formidable*, which will, it is expected, take place about the middle of this month. It is hoped that a few hundred tons of metal will be ready by the time that this event takes place. The system of preparing so much beforehand is one not exactly to be commended, unless the commencement of a vessel dates from the time when the drawings are delivered, for it gives the public a false idea of the rapidity with which we build our war vessels. The *Gladiator*, although it is not quite eighteeen months since her launch, has not yet received her boilers, and it will be several months before she is ready for sea. But now that the strike is over it is hoped that some of the arrears of work will be hurried on, and some of the lost time made up.

A New Evolution.

The importance which the rapid coaling of our warships has now attained has become apparent to all. The Channel and Mediterranean squadrons have long been keen rivals for the honour of beating the record time for coaling, and now that the competition has become so keen, it is only to be expected that the squadrons on the foreign stations will enter the lists. The crews of the various ships are encouraged to work against time by the officers, who themselves contribute not a little towards the ultimate success. The rapidity with which a ship can take in coal may become of real importance in time of war, and the saving of only a few hours may conceivably settle the issue of a battle. As an example of what can be done, it may be as well to point out the best time at the recent experiment at Portsmouth. The *Magnificent* took in 979 tons in less than seven hours, an average of 140 tons per hour, which, however, is not *the* record, which is held up to the present by the *Magnificent* with 174 tons an hour, or nearly three tons a minute! But there is yet much to be done as regards the appliances for coaling ships, which are not all that could be desired. "Make all possible sail" was the premier evolution in the old days,

but the order to take in coal as rapidly as possible would seem to have taken its place to-day.

The Disaster in the "Bouncer."

The terrible accident which occurred on board the *Bouncer*, the tender to the Naval Gunnery School at Sheerness, has naturally cast somewhat of a gloom over that place. It appears that the *Bouncer* was out at gun practice near the Nore, and some seven or eight rounds had been fired from her 6-in. quick-firer, and when the gun was again loaded the cartridge exploded in the breach, killing two men and wounding six others. She at once steamed back to Sheerness, and everything possible was done by the medical staff to alleviate the sufferings of the living. The two men killed, Gunnery Instructor Clancy and leading seaman Thompson, had sustained frightful injuries, the left arm of Clancy being missing, having been blown off close to the shoulder. Of the other men, only two of them had sustained any serious injury, snd these were sent to Melville Hospital, Chatham. At the funeral of the two men killed, Captains Mann and Bickford were present, and the Admiral's band headed the procession. Admiral Hotham was represented by his flag lieutenant. Full naval honours were accorded the deceased. A court of inquiry was held to investigate the circumstances attending the accident, but as usual, the proceedings were private. Second-class petty officer Jones is to be advanced to the rank of first-class petty officer as a reward for his courageous conduct at the time of the accident.

Devonport Dockyard.

As usual there is plenty of work going on here, both constructional and repairing. Of the vessels building the *Psyche* makes good progress, and although she has not been put together with as much celerity as was the case with the early stages of the *Ocean*, her progress has been very satisfactory. Material is being prepared for the *Implacable*, and there will be a good stock to draw upon immediately the keel plate is in position. £100,000 was to have been spent upon this vessel in the current financial year, but it will now be impossible to spend such a large sum on her in the time left. Difficulties still bar the way of the *Ocean* as regards construction, and delay is now being experienced in connection with the delivery of her armour plates. However, the dispute in the engineering trade is responsible for most of this. Another thing which has materially interrupted her rapid progress is the want of a jetty large enough for a vessel of the *Ocean's* dimensions to be laid alongside. The apparatus for lifting armour plates and other heavy material is also not the best. However, when the new jetty is ready, an apparatus capable of lifting 100 tons will be a prominent feature there. The proposal to entertain the ship's company of the *Philomel* was a good one, and it is a thousand pities it fell through from lack of support. However, it is stated that the residents of Stonehouse have decided to entertain the officers and crew, which is very creditable to them indeed. The *Philomel* has done much good work on the Cape and has taken part in several expeditions, although of course not so many as the *St. George*. The gunboat *Snap*, tender to the *Cambridge*, is undergoing refit here. Her four sister ships, the *Bonetta*, *Bulldog*, *Cuckoo*, and *Scourge*, are also to undergo refit. The Admiralty have decided to have them all reboilered. The *Anson*, on her return from the Mediterranean, will pay off here, and subsequently undergo a refit at a cost of £11,000. When this work has been carried out she will probable relieve the guardship *Collingwood* at Bantry. The *Sirius*, too, on her return from the Mediterranean with relieved crews, will be prepared for a journey to the East Indies with a relief crew for the *Pigeon*.

Welcoming Home the "St. George."

The reception which the officers and crew of the *St. George* met with on their return to Portsmouth, after their many years of arduous service abroad, will, we hope, be the forerunner of many other such hearty welcomes. Until now, no matter how much fighting and hard work a ship's company has gone through, the only reception they got on their return home was from the wives, sweethearts, and other relations of those on board, but such a thing as an official welcome home is an entirely new suggestion. The gracious reception by the Queen of the officers and men too is a great compliment to the Navy generally, and a sign that the Queen appreciates the services rendered by the Naval Service. The whole affair was from beginning to end at the Queen's initiative. Jack and Joe will long remember the day when they were personally thanked by the Queen for the work they had done for her. The public dinner at the Town Hall, Portsmouth, was also a great success from beginning to end, and none appeared to appreciate or enjoy it more than those who sat down to it. Officers and men of all grades, combatants and non-combatants, had all done their level best to thoroughly and effectively carry out their duty, and the thanks of the Queen and public were certainly deserved.

The Disaster to the U.S. Battleship "Maine."

The greatest sympathy with the United States Naval Service is felt here on account of the terrible misfortune which has overtaken it in the loss of the battleship *Maine* in Havana Harbour. On the first set out all sorts of absurd rumours were afloat, and war was freely predicted by everyone between the United States and Spain, for, said they, who else could have wished to do such a dastardly act? But here in England, at least, that feeling has been dispelled, and now no one doubts but that it was an accident, pure and simple. In America, of course, the greatest excitement reigned, and we are told that one evening paper alone sold over a million copies during the course of the afternoon and evening, running into nearly thirty editions, each of them asserting that war had been declared between the two countries. This was partly assuaged by the message from the captain of the unfortunate vessel, who telegraphed his belief that the catastrophe was accidental, and that public opinion should be suspended until a further investigation had been made. The officers of the Spanish vessel, *Alfonso XII.*, did all they could in the way of rescue and were foremost in offering their heartfelt sympathy to the Americans. The exact cause of the accident has not yet been properly ascertained, but whether it was an explosion of a torpedo, of coal gas, or a magazine which caused the accident, will, no doubt, be arrived at in due course. It was suggested that it was the work of an infernal machine on board, and again, that it was caused by a special high explosive which the *Maine* had on board, but how much truth there is in these statements remains to be verified. Americans have always extended their sympathy to us when misfortunes of a like nature have overtaken us, and therefore they may rest assured that British seamen feel the loss of the ship and lives as much as they do.

Chatham Dockyard.

Preparations are actively going on for the laying down of the new battleships *Irresistible*, sister ship to the *Implacable* and *Formidable*. She is to have two protective decks to cover the vital parts of the ship from end to end, and her armament is to be similar to that of the *Majestic*, as are her coal bunkers. Her bows will be protected with two inches of nickel steel, but her hull armour will be of the same thickness as that of the *Majestic*. The quality of the armour, however is to be superior, nickel steel being used, in order to increase the protection, buoyancy and stability of the vessel. We are also told that before and abaft the citadel armour the sides are to be protected by thin armour, the same as the *Canopus*. The barbettes containing the 12-in. guns will be similar or equal to the protection afforded those of the *Majestic*, and the same may be said in regard to the 6-in. guns. The ram is to be carried slightly higher than is the case in the *Majestic*, somewhat similar to the *Goliath*, as it is contended that this is necessary if an effective blow is to be dealt to an opposing ship. Over £57,000 are to be spent on the vessel this financial year. A good deal of repairing and refitting has been going on here, including the *Northampton*, which has been having defects attended to. The *Thetis*, which had to be prepared for the pennant, the *Ajax*, which has had her magazines and shell-rooms altered, and the *Triton* has been undergoing a thorough overhaul. The *Vindictive* is the only vessel completing and she will, it is expected, be ready for her trials in April. She shipped her three funnels recently. It is hoped that nothing will interfere with the launching of the *Goliath* on the 3rd of this month.

Further Trials of the "Diadem."

The conclusion of the trials of the cruiser *Diadem* took place a week or so ago, and the results attained cannot but be said to have been satisfactory to all concerned. But it will be quite four months before she is ready for commission, when she will relieve the *Blake* in the Channel Squadron. On her eight hours' full power trial over a measured distance of twenty-three miles, she made a mean speed of 20·6 knots, which is just a quarter of a knot in excess of the requirements of the Admiralty. It was a thoroughly successful trip, there being practically no air pressure,

and very little vibration being felt, the economisers fully answering expectations. Sir John Durston was so pleased with the result that he warmly congratulated Mr. Gracie, the engineering manager for the contractors, the Fairfield Co. Later, she carried out a four-hours supplementary trial with the idea of finding out whether she could, with only 78 per cent. of her boiler heating surface, obtain the same power as was required of her at her full power trial. Forced draught was used to a slight extent, the air pressure amounting to three-tenths of an inch, and the total H.P. used was 15,861. The coal consumption worked out at only 1·95 lb. per I.H.P. per hour. The result of the trial spoke highly for the general excellence of the improved Belleville boilers with which she is fitted. The experiments demonstrated that in the event of one boiler compartment becoming disabled the designed power of the cruiser could still be obtained. The contractors, altogether, are to be congratulated on the *Diadem*, for there is no doubt that she is a splendid accession to the Navy.

Sheerness Dockyard.

The new sloops *Condor* and *Rosario*, which are building here, continue to progress rapidly. In order that they should reach the stage which it was intended they should by the end of the financial year overtime is being freely resorted to. There is very little difference between them and the *Torch* and *Alert*. The *Rosario* is to have her machinery made at Keyham, as the chief engineer's department at this yard has its hands full. Messrs. John Penn & Sons, of Greenwich, have secured the contract for fitting the machinery to the *Condor*. Both vessels are to be fitted with water-tube boilers. The engines of the *Pomone* are also to be fitted by Messrs. Penn, who, it will be remembered, supplied the machinery of the *Illustrious*. Overtime is being somewhat extensively resorted to in order to expend the money voted for the *Pomone*, *Proserpine*, and the new sloops before the end of the financial year. The arrival and departure of the Channel Squadron, too, made everyone here busy, but their preparation for sea was carried out without a hitch. The official date for the completion of the *Proserpine* is June 1st, and she will probably hoist the pennant for the naval manœuvres. She will probably be attached to the Channel Squadron, and if this is so will join after the mobilisation.

The Health of the Fleet.

The report which the Director-General of the Medical Department has just issued dealing with the health of the Navy, affords instructive and interesting reading. From it we gather that the aggregate number of cases of disease and injury recorded for 1896 are less numerous than any for the past forty years. Compared too, with the year previous, the report shows that the the death rate is less, as are the number of cases entered on the sick list, but the invaliding rate has slightly increased. The lowest sick rate appears to be on the south-east coast of America station, and the highest on the home station, where the ratio per thousand of sick men was 41·85, while on the south-east coast it was only 31·78. We learn, too, that the invaliding rate has increased on all but the Cape station which is accounted for, perhaps, by the decrease in the number of cases of malarial fever due to less river work than in the preceding year. The Mediterranean station comes next to the south-east coast of America in the report for healthiness, although it has often been said to be the most unhealthy. The hygienic advance in the Navy in the forty years during which the report has been issued must be considerable, for whereas in 1856 the death rate from disease was 12·1, in 1896 it was only 3·8.

Warships in the Far East.

It is somewhat difficult to exactly get at the real naval strength of the various Powers in the Far East. Japan has upwards of a dozen almost new vessels, some of them of the heaviest and newest types of battleships. She is, moreover, at home, and is well suppled with torpedo craft. Russia and England possess nearly as many fighting ships each, and both Powers are reinforcing their squadrons. Russia has recently sent the cruiser *Rossia* out and the *Vladimir Monomac*, a renovated, armour-plated cruiser, has passed through the Canal. On the other hand, England is dispatching the battleships *Barfleur* and *Victorious*, while from the Australian station she has drawn the *Orlando*, now at Singapore. Moreover, from the British squadron in the Pacific, Australia and the East Indies, supplementary reinforcements could speedily be dispatched to the scene of action. France and Germany are not so well represented, although the former power has recently ordered three cruisers, two from home and one from the Pacific, to reinforce her squadron. She has also a base at Saigon, but it is far removed from what would probably be the scene of hostilities should events bring about action in Chinese waters. The German ships, though not all of high fighting power, includes the *Deutschland* and *Kaiser*, recently sent out, and six other cruisers. In the event of hostilities breaking out, and Japan siding with England, between us we should hold the balance of power out there, our fleets numbering more vessels than those of Russia, Germany and France put together. Japan, too, has naval bases, docks, and what is equally if not more important, coal, close at hand, whereas the other fleets in Chinese waters are far from any use of real value.

Pembroke Dockyard.

The principal work in hand at this yard is that in progress on the *Andromeda*, *Spartiate*, and the new Royal yacht. The *Andromeda* makes fairly good progress, as nearly all her water-tube boilers have been fixed, and it will not be long now before her funnels are put in position. The *Spartiate* is not proceeding very fast as regards her construction, which has been practically suspended on her. The *Andromeda* and the Royal yacht are both to be pushed on, and the *Andromeda* is to be completed during next year. The official description of the Royal yacht is as follows:—Length, between the perpendiculars, 380 ft.; extreme breadth, 50 ft.; draught forward, 17 ft., aft 19 ft.; displacement, 4,765 tons; H.P., 11,000. It was originally intended to give the vessel only half this H.P., but for some reason or another a change was made in the building programme and her H.P. doubled. Admiral Sir F. W. Richards, the First Naval Lord, Rear-Admiral A. K. Wilson, V.C., Controller of the Navy, and Sir Evan Macgregor, Permanent Secretary, representing the Board of Admiralty, paid us an official visit recently. Their lordships took much interest in the proposals for new gunnery and electrical workshops. They also inspected the cruisers *Andromeda* and *Spartiate*, and went over the new Royal yacht.

THE PROTECTION OF STEAMSHIPS' PROPELLER SHAFTS.

THE exceptional liability to injury of steamers' propeller shafts has always been a source of anxiety, and any device calculated to prevent damage in this vital part must prove of great interest to all concerned in the successful working of steamers.

It has been demonstrated that 90 per cent. of the accidents to shafting occurred at the propeller end; the excessive proportion of casualties at this point being chiefly attributable to corrosion caused by the admission of sea water to the stern tube and shaft.

The effect produced by the corrosive action is a gradually deepening groove round the shaft close to the brass liners. The shaft being thus weakened, easily succumbs to the strain of heavy weather, causing loss of propeller and probable destruction of ship.

Among the devices used for counteracting the particular corrosive action referred to may be mentioned Cedervall's Patent Shaft Protective Box, a Swedish invention now being introduced into this country by Mr. George Noble, of 7, Dean Street, Newcastle-on-Tyne. The invention has been fully tested on Swedish and Danish steamers, the results achieved being such as to entitle it to the attention of English shipowners.

A word as to the fitting and working of the appliance may not here be out of place. Brass liners on the shaft are dispensed with, and the stern tube is the same as now in general use, except the after bush, which is simply of cast-iron instead of Lignum Vitæ. Grooves are cut longitudinally in the bearing, which serve the twofold purpose of admitting to the bearing the oil with which the stern tube is completely filled, and allowing the escape of air. The patent-box is bolted to the fire side of the propeller, and has a movable ring faced with anti-friction metal, which works against the flange of stern bush, being kept in close contact by spiral springs inside. By this means sea-water is effectually excluded from contact with the shaft, and oil leakage is reduced to a minimum, the small loss being made up by means of a small pump or other effective method.

By the foregoing invention corrosion is made practically impossible, in proof of which it is stated that in no case where it has been applied has such occurred.

We understand the appliance has been ordered for a number of locally-owned steamers within the past few months, and there appears to be good reason to expect that its use will be quickly extended.

NAVAL ENGINEER APPOINTMENTS.

The following appointments have been made at the Admiralty from January 25th, to February 22nd, 1898:—

Abbott, Wm. J., fleet engineer to the *St. George*, to date February 19th.

Adams, Wm. H., chief engineer to the *Victory*, additional for the *Naiad*, to date March 3rd.

Ash, H. G., assistant engineer to the *Conqueror*, to date February 16th.

Baker, Alexander, engineer to the *Ardent*, to date January 31st.

Benn, Edward P. St. J., assistant engineer to the *Bonaventure*, to date March 3rd.

Blakeman, Mark, chief engineer to the *Apollo*, to date February 15th.

Brown, Wm. J., staff engineer to the *Pembroke*, additional, for the *Andromache*, to date March 3rd.

Carnt, Albert J., engineer to the *President*, additional, to date February 3rd.

Chater, Francis A., assistant engineer to the *Jupiter*, to date February 3rd.

Coolican, John P. J., staff engineer to the *Thetis*, to date January 31st.

Crichton, W. H., engineer to the *Rodney*, to date January 29th.

Garde, Robert B., engineer to the *Skate*, to date February 15th.

Heyes, H. W., acting engineer, has been confirmed in the rank of engineer in Her Majesty's fleet.

Holgate, G. S., engineer to the *Ramillies*, to date January 31st.

Huddy, Chas. J., engineer to the *Hannibal*, to date February 3rd.

James, Wm. H., engineer to the *Halcyon*, undated.

Lawrence, Wm. G., engineer to the *Australia*, to date February 3rd.

Legate, W. P., assistant engineer to the *Surprise*, to date February 16th.

Magrath, Francis, assistant engineer to the *Renard*, to date February 16th.

Marsh, H. E., staff engineer to the *Sans Pareil*, to date February 15th.

Meynell, Piers H., probationary assistant engineer to the *Magnificent*, to date February 4th.

Moore, Albert J. C., probationary assistant engineer to the *Rodney*, to date March 3rd.

Mortimer, John E., engineer to the *Victory*, to date February 3rd.

Owen, John A., assistant engineer (temporary), to date March 3rd.

Perkins, Geo. L. R., chief engineer to the *Thetis*, to date February 15th.

Pratt, W. H., engineer to the *Colossus*, to date January 31st.

Pring, Fredk., engineer to the *Research*, to date January 31st.

Reper, Robert St. J., engineer to the *Scout*, to date February 15th.

Rock, Herbert E., assistant engineer to the *Pembroke*, additional, to date February 15th.

Rolle, A. R., engineer to the *Ariel*, to date February 2nd.

Saunders, Alfred, assistant engineer to the *Thetis*, to date February 15th.

Smith, Frederick P., chief engineer to the *Bonaventure*, on commission.

Stuart, Martin, chief engineer to the *Vivid*, additional for the *Gordon*, to date February 19th.

Sydenham, F W., assistant engineer to the *Hibernia*, to date February 16th.

HOAR & BROWN'S HARDWOOD MARKET REPORT, FEBRUARY 21st, 1898.

TEAK.—Considering the large quantity of logs now landed, and the fact that Admiralty requirements for the present year are given mostly in favour of floating cargoes, there will be ample stock for ordinary enquiries for some considerable time to come. Nevertheless, cargo quotations are not expected to decline, and although the shipbuilders are showing little anxiety to purchase, the major portion of the landed stocks, being held by three firms, are not likely to suffer from any reduction in values. The landings for the past month were considerably above the average, but the deliveries were also beyond the usual quantity, which leaves the stock much about the same as it was on the 1st January, viz, 10,482 loads.

MAHOGANY.—*Honduras.*—The market remains firm for good quality wood, but for small and inferior logs the price is lower.

Tobasco.—The late sales show a decided improvement in prices, and the stock is limited. Minatitlan is selling badly, except prime good wood.

Panama.—Good sound wood is selling well, but most of the importations are being landed in a very shaky condition, and no bids are now being obtained for the very doubtful parcels arriving.

African.—The imports have been exceedingly heavy, and most of the wood small; some inferior parcels of very light colour realizing absurd prices. Values have declined, and are likely to go still lower, should the shippers continue to force further large quantities on the market.

Cuba.—The stock has become so reduced there is practically none to quote from. A cargo is expected, but prices will probably be beyond reasonable bounds.

CEDAR.—Prices are fairly good, and stocks are low.

SEQUOIA.—Although there is very little in the market, quotations are still much below remunerative values. The outports hold largely, and are offering at low figures.

WALNUT WOOD LOGS.—The sale is very much restricted in consequence of the continued arrivals of prime lumber which take place.

WHITEWOOD LOGS.—There is no demand for logs, but the arrivals have of late been large. The board trade is now unequalled for low quotations.

KAWRI PINE.—There is a steady demand for planks, but the retail values are still about the same, and appear likely to continue so for a time, although shippers are now asking a further 10 per cent. for forward delivery.

INDUSTRIAL AND TRADE NOTES.

THE CLYDE AND SCOTLAND.

(*From our own Correspondent.*)

AS forecasted in our last month's Notes, the great engineering struggle is now not only at an end, but the vast armies of artizans are again hard at work, full time being put in as if the thought of an eight hours' day was utterly repugnant to them. Happily there is not only a big arrears of jobs to work off but an immense volume of new work: and the flow of orders still continues. There is, of course, not now the reticence on the part of employers as to the new work booked and coming forward, with the result that the recording of contracts is a daily occurrence.

The past month's bookings in Scottish districts, the Clyde especially, tot up to a very large aggregate, and at the present time there cannot be less than between 450,000 and 480,000 tons of new shipping on hand and to begin on the great Scottish shipbuilding river. Greenock and Port-Glasgow—forming "the lower reaches"—have shared more abundantly perhaps than the upper reaches, but then "tonnage" only measures one side of shipbuilding industry, and as most of the shipbuilding firms in Port-Glasgow are not themselves engineers, it falls that that part of the work must be done elsewhere, and Glasgow engineering firms have therefore been requisitioned.

By far the most important contracts have been booked by the Fairfield Co. These comprise two large first-class passenger steamers for Sir Donald Currie & Co., for the Cape trade, and one large passenger steamer of 5,000 tons for the Pacific Steam Navigation Co. The new Castle liners will each be 550 ft. long and will form the largest vessels in the Castle Line.

It may here be remarked that it is understood the Castle Line are in the market for "intermediate"—or combined passenger and cargo—vessels of moderate speed. Messrs. Barclay, Curle & Co., Whiteinch, have hitherto built the most of these, and they launched the most recent addition, the *Braemar Castle*, on the 23rd ult. It is not improbable, therefore, that their stocks may be again requisitioned. The China Mutual Navigation Co. are also in the market for one or two large steamers, and the contracts may be booked by Clyde builders, or "the folks over the way"—the great shipbuilders of Belfast—may receive the orders.

Greenock and Port-Glasgow shipbuilding and engineering firms have, as already stated, received the most of the orders placed since the end of the strike, and at no previous time has there been such a volume of important work in hand, and fairly distributed among the several firms, than at present. The aggregate tonnage on hand, and to begin to, approaches 160,000 tons, the number of firms being ten.

Messrs. William Hamilton & Co., Port-Glasgow, were amongst the first to reap the benefit of the "moving of the waters" due to the settlement of the engineering trouble, and within a short time booked orders from London owners for six large screw steamers, each of about 5,400 tons deadweight capability. The machinery for the whole of these vessels will be supplied by Messrs. David Rowan & Sons, Glasgow—Messrs. Hamilton & Co. not being themselves engineers—who have already under construction the engines for six other vessels of almost a like size to the above, also in the shipyard of Messrs. Hamilton & Co.

Messrs. Blackwood & Gordon, Port-Glasgow, are busy in there engineering department, and of course at the present time they are also having their patent hauling-up slip busily requisitioned. While not so busy in the shipyard, still their stocks are by no means idle. They have two steamers on hand for Swedish companies, and they have recently also contracted to build and engine a steel screw steamer of 130 ft. keel for the Irish Lights Commissioners. Although of very moderate length, this vessel is to attain a speed of 11½ knots.

Messrs. Robert Duncan & Co., shipbuilders, Port-Glasgow, have contracted to build a cargo steamer capable of carrying about 6,000 tons, which will be supplied with triple-expansion engines by Messrs. Rankin & Blackmore, Greenock.

Messrs. David J. Dunlop & Co., Port-Glasgow, have contracted with the Douglas Steamship Co, Hong Kong, to build and engine a 2,000-ton steel screw steamer for passenger and cargo service round the coasts of China.

Messrs. Carmichael, McLean & Co., Greenock, one of the most recently established shipbuilding firms on the Clyde, and both of whose partners were for many years engaged in the great Fairfield yard—have been booking orders for new ships very freely since the termination of the strike, and with the work they already had in hand, the new contracts will keep their works in very active operation for many months to come. Some of their recent contracts not already recorded in these Notes are:—A steel screw steamer of 2,100 tons deadweight capacity to be built for the Vendela Steamship Co., of Copenhagen, to be fitted with triple-expansion engines by Messrs. Muir & Houston, Glasgow; a steel screw steamer of 1,700 tons carrying capacity to the order of the Rederi Aktiebolaget, of Sweden, also to be engined by Messrs. Muir & Houston, and two steel screw steamers, each of about 450 tons gross register, for Glasgow owners; Messrs. Muir & Houston again in this case being the engineers.

Messrs. Caird & Co., Greenock, have contracted to build and engine a steel screw steamer of 5,000 tons register for the Pacific Steam Navigation Co., similar to the one already noticed as having been placed at Fairfield.

Messrs. Scott & Co., Greenock, although they have not booked any very recent orders, are not in immediate want of work, to say the least, as they have at present on hand as many as six screw steamers, all to the order of the China Navigation Co. These vessels—the first of which has just been launched—are 275 ft. long, 38 ft. beam, 22½ ft. deep, and 2,100 tons gross register, and 2,700 tons carrying capacity. Messrs. Scott & Co. also supply the engines, which are triple-expansion, the cylinder being 20 in., 32 in., and 52 in. with 39 in. stroke.

Messrs. Chambers Bros., yacht and launch builders, Greenock, have received orders to construct twelve of their patent semi-collapsible lifeboats, six of these being intended for the screw steamer *Arizona* (old Guion liner) now refitting out at Fairfield, and six for a Japanese Steamship Co.

Messrs. Thomas Orr, jun., Greenock, and S. J. Clark, late of Arbroath, have purchased the Clyde Patent Yacht Slip, Greenock, where they will carry on and considerably develop the yacht and boat-building business hitherto carried on by Mr. Thomas Orr, jun.

Messrs. S. McKnight & Co., Ayr, under the spirited and able *regime* of Mr. Walter Scott, who some time ago left the firm of Messrs. William Denny & Bros., Dumbarton, to assume the reins of management at this yard, are securing a good many orders. The most recent is for a steamer of about 800 tons for Norwegian owners. The company's excellent and highly capable hauling-up ship is being also well occupied.

The Mount Vernon Iron and Steel Co. is the title of a new concern which has been formed to restart the Mount Vernon Steel Works, Shettleston, which have been closed for many years. The managing partner and principal of the new concern is Mr. William Muirhead, who has been connected with the steel manufacture in Scotland since its inception at Newton Steel Works (Steel Co. of Scotland) until the present time.

Messrs. Menzies & Co., Limited, of Leith, continue to be very busy in their ship-repairing department, especially in that branch involving repairs to engines and boilers, and to cope with the demand they are doubling their machine shops.

Messrs. Hawthorns & Co., Leith, have received an order from our Government to build two special service steamers, one to be stationed at Malta and the other at Chatham. The company have also received an order for a steam trawler for Ostend, and at present have alongside their works a splendidly-modelled steam yacht of about 180 ft. in length, recently sent off their stocks.

Messrs. Hall, Russell & Co., Aberdeen, have received an order for two steel steam trawlers of 160 tons each, to be fitted with engines of 320 I.H.P.

For the vacant post of superintendent of the Tay ferries, caused by the retirement of Captain Methuen, over fifty candidates applied, the applications being from Dundee, Aberdeen and other seaports in the East of Scotland, as well as from Glasgow, Paisley, Dumbarton, Greenock and other West of Scotland ports, while at least one applicant hailed from the metropolis. The Ferries Committee some days ago fixed the limit of age of candidates at 45 years, and at the same time to reduced the short list to seven names, consisting of local men, with the exception of two hailing from Glasgow. The appointment was made two days ago, the final vote being between Captain James Young, Dundee, and Captain H. McKay, Tayport. On a division the first named had a majority, and it was resolved to recommend his appointment to the Harbour Board. Captain Young has been 26½ years at sea in Dundee ships, having for the last 16 been in the employ of the Loch Line Shipping Co., and is at present in command of the steamer *Loch Tay*.

Mr. S. J. P. Thearle, surveyor to Lloyd's Registry, Glasgow, recently gave an interesting lecture before the Glasgow University Engineering Society, the title of which was "The Morbid Anatomy of Iron and Steel Ships." Mr. Thearle stated that the title of his lecture was a phrase which originated with the late William Denny, and was adopted on this instance because it so aptly described what he had to say. The inspection from time to time of ships being built was of an undoubted educational value to students of Naval architecture, inasmuch as it showed them the applied results of experience. But a persistent examination of existing vessels as they come under repair in dry dock is productive of even still more instructive results, for in them there is presented the data itself upon which further improvements will be based. The lecturer then proceeded to classify iron and steel ship diseases under two general heads:—1st. Diseases of constructional weakness; and 2nd, diseases of material decay. The first of these was further subdivided into cases of structural weakness and those of local weakness, and Mr. Thearle's lucid, informative, and even at times amusing, dissertation on all heads was greatly appreciated.

Mr. Peter Whyte, C.E., the able resident engineer and superintendent of docks at Leith, delivered a popularly interesting, and at the same time most practical lecture, on February 14th, before a meeting of the Royal Scottish Society of Arts, Edinburgh, on the subject of "Hydraulic Machinery at Leith Docks." He said that one of the earliest and most useful applications of hydraulic power was in the adaptation of machines for loading coal in vessels. The first two machines

were constructed by Sir W. G. Armstrong & Co., and erected at the Bute Docks, Cardiff, in the year 1857, and that as he (the lecturer), in after years, personally superintended the working of these machines, and had them removed and replaced 25 years later by others of much greater power during his tenure of office as assistant engineer at the commercial capital of Wales, and as it was at Leith, the ancient port of the Scottish capital, that hydraulic machinery in Scotland was first applied, and as the working of the latter was now under his direction, it had been thought that he had a claim to introduce such a subject to his hearers. The lecturer then proceeded to give a description of the various methods of working lock and large modern dock gates by means of hydraulic power, which are employed at Leith. Going on to speak of hydraulics in their application to the working of swing bridges, he stated that the Victoria Bridge at Leith, which had a clear span of 120 ft., was at the time of its erection in 1874, the largest bridge of its kind ever made. The machinery at Leith for the shipment of coal was then described in detail, both in the way of cranes and hoists, after which Mr. Whyte dealt with the hydraulic cranes at the docks for the loading and unloading of vessels, saying that he hoped a portable crane of 20 tons capacity would be in use at Leith as soon as the construction of the new dock was completed. In speaking of the working capacity of light portable hydraulic cranes, such as are at present in use at Leith, he said that he had seen as many as 100 consecutive lifts made by the one man in charge of the mechanism in an hour, which meant that about 100 tons of material had been handled in that time. There was, he added, no type of steam crane by which such rapid work could be done.

THE TYNE.

(*From our own Correspondent.*)

Shipbuilding.—Since the settlement of the engineers' strike, an extraordinary impetus has been given to shipbuilding, and most of the leading firms on the North-East Coast have been importuned to accept orders for delivery at dates which could not be entertained under present conditions of production. Very few firms indeed are now in a position to guarantee delivery before 1899, and there are many who cannot undertake to accommodate customers till the century has very nearly run its course. There is a great quantity of accumulated work in hand which could not be dealt with while the strike of engineers was keeping down production in the engineering shops, and it would have been a great advantage had there been time to get this cleared out of the way, before the inrush of new orders had commenced. For some occult reason, shipowners are now showing greater eagerness to add to their shipping investments than they have evinced for many years; and it is not improbable that some will go farther than in a calmer frame of mind they might think safe, before the inevitable reaction begins. There is, it is to be feared, an element of speculation abroad; for otherwise it is difficult to account for the abnormal demand that has arisen, there being nothing in the state of freights, or in the other conditions affecting shipping, to justify the persistent pressure for accommodation that is now being put upon shipbuilders, by a section of owners. Though, as has been indicated, most of the leading firms are heavily booked forward, and are consequently unable to treat for further work excepting on long terms for delivery, the run of enquiries is still unchecked, and orders continue to be freely placed, either on long terms, or without any specified date for delivery. It is, indeed, generally estimated that the work already booked will keep the larger number of firms busy over next year, as well as this, so that—whatever may happen afterwards—there is a good run of prosperity immediately ahead for all connected with the construction and equipment of steamers.

So far as the Tyne is concerned, the vexed question of work demarcation has apparently been rendered one of easy solution in the future. An arrangement has been arrived at between the shipbuilding firms and the representatives of the Shipbuilding and Engineering Trades (operatives') Federation, under which a disputed point may be referred for settlement to a court of referees, in the event of the parties directly concerned being unable to arrive at an amicable solution. The referees are five in number, and are, we are pleased to note, in each case representative of the employing interest, by which means the final decision on any disputed matter is left with the employers. This, of course, is as it should be; but we think the same end might have been attained in a less roundabout way. It seems to us that they who provide the work and pay for its execution, possess the exclusive right to say what classes of labour shall be employed in connection with the various processes required in its manipulation, and we feel convinced that a lot of future trouble would be avoided, if the employers were to content themselves with exercising their prerogative in a direct manner, instead of relegating it to a committee even of their own nominees. Workmen are, unhappily, too much given to repudiating awards that are not in accord with their own wishes to be trusted too implicitly to acquiesce in every decision which may be made by the committee of employers' representatives referred to, and it would be to the advantage of all interests, if the employers would decide upon acting according to first principles and reserve to themselves and their managers, in each case, the right of apportioning the work among their employés as they may think fit.

The two yards of Messrs. Armstrong, Whitworth & Co., at Elswick and Low Walker, continue extremely busy, the bulk of the work in hand consisting of war vessels. At the Low Walker establishment, however, oil ships are a speciality, and it is reported that an order for a vessel of that description, for Belgian owners, has recently been added to the prospective work of the yard.

Messrs. Wigham Richardson & Co. have booked an important order lately, and this, as well as most of the other work in course of execution at their yard, is understood to be for foreign owners. Messrs. W. Dobson & Co. have also a quantity of foreign work in hand, and have recently booked one or two orders from local owners.

Messrs. C. S. Swan & Hunter are reported to have increased their prospective work engagements, by an order for a steamer of the very largest class, and up-to-date equipment. Seeing that the firm have made arrangements for dealing effectively with this class of work, it is naturally to be expected that they will aim at securing a good share of the orders for mail and passenger vessels that may henceforward come into the market. The building of first-class boats having wood decks under cover is an advantage which must commend itself to owners; for by this means the deteriorating influence of damp is prevented during construction, which circumstance is of the first importance, tending materially to the permanent soundness of the structure. The building sheds which the firm erected a few years ago, and which now constitute the most imposing sight upon the Tyne, have never been unoccupied since their completion, and during that comparatively short period a very large amount of tonnage has been launched from them. In the matter of machinery equipment, the firm have surpassed many, and have attained a level of equality with the very foremost of their competitors. They are therefore in a position to meet the requirements of shipowners on terms of advantage, and there is not the least reason to doubt that their enterprise has done much to stimulate and maintain the prosperity of Tyneside shipbuilding.

The Palmer Shipbuilding & Iron Co. have booked an order for a 7,000-ton steamer within the past few days, and they must now be very "full up" indeed. It is on the cards, however, that they may resume work in their Howdon establishment ere long, in which case their resources for production will be very considerably augmented.

Messrs. Readhead have, as usual, their berths fully occupied with new work, and in their repairing department business is as brisk as could be desired.

The operations of Smith's Dock Co., North Shields, during last year have been exceedingly successful, the profits amounting to £15,345 16s. 9d. (including £493 14s. 6d. brought over from the previous year), out of which it is proposed to write off for depreciation £5,500, and to pay dividends of 5 and 10 per cent. respectively on the preference and ordinary shares. The substantial increase of profits is attributed to the working of the new pontoon dock, which was brought into use in January last year.

Engineering.—The marine engine works are now in full swing, night shifts having been started in every instance. Though no men have, as far as we can learn, been displaced, very nearly all the hands who were "out" through the dispute, have now been reinstated in employment, and we are pleased to be able to say that no friction has arisen, and no indications of the existence of bad feeling have come to light. Work is now going on very

smoothly, and the productive capacity of the different establishments has been so largely increased as to give rise to the expectation that the arrears of work will be got through more expeditiously than was anticipated. This is very satisfactory, and it is greatly to the credit of all parties that no instances of recrimination have occurred. Much has been said about the enormous losses sustained through the late strike, but it has apparently been forgotten that there are some compensations, among which we may reckon an immunity, for years to come, from petty squabbles in the works, and vexatious attempts at interference with the employers' undoubted right to manage their works in such ways as may seem best to them.

The North-Eastern Engineering Co., Wallsend, have just completed the engining of the s.s. *Sallust*, built at Middlesbro' to the order of Messrs. Lamport & Holt, Liverpool, and on the 17th inst. the vessel had a successful trial, attaining an average speed of 13½ knots, the machinery running with perfect smoothness throughout. The firm have a number of other important contracts in hand, and will doubtless attain an exceptionally large output this year. The Wallsend Slipway Co. have also several big contracts in course of execution, and at the Neptune Works, Low Walker, the pressure of work is unusually great. At all the works vessels are being engined, while others are waiting "turns" to be similarly dealt with.

The St. Andrew's Engine Works, Newcastle (Messrs. Donkin & Co.), are just now very busy, and overtime is being largely resorted to. Orders for the firm's steering gears are numerous, and there is also a good demand for their special type of ash-hoisting engine. The firm have just received a repeat order for 12 of these engines from a well-known shipbuilding firm in the north.

Messrs. Harfield & Co., of Blaydon, are well supplied with orders for windlasses and other shipping accessories of special types, and since the termination of the strike their output of work has been substantially increased. In the forges business is now quite brisk, and foundries are showing a steadily increasing tendency towards fuller work. Steel works are also very busy.

THE WEAR.

(From our own Correspondent.)

Shipbuilding.—Messrs. Short Brothers have commenced the erection of a quay or jetty along the river frontage of the additional premises acquired by them some time ago, and which it is expected will be principally utilised for repairing purposes. When the new jetty is completed, several vessels will be able to come alongside at once, and be dealt with simultaneously. As the firm have often as many as half-a-dozen steamers under repair at one time, the need of the improvement now being made is apparent.

Messrs. Doxford have three "turret" ships on the stocks, besides the 30-knot torpedo destroyer, which is already well on for being framed. The three "turrets" occupying the berths need not be taken as even approximately representing the amount of work in hand, as it is known that there are at least nine others to follow.

Messrs. Pickersgill have now three vessels on the stocks, two of them being for Liverpool and one for Cardiff. This firm also have other work, in addition to what is seen on the stocks, and the same may be said of Messrs. Priestman, whose berths are at present all filled.

At Messrs. Robert Thompson & Sons' yard, there is still an abundance of work, and Sir James Laing has six steamers in progress, of an aggregate capacity of 30,000 tons. Among these are two Japanese boats of superior type and elaborate equipment, one of which, it is expected, will soon be ready for launching.

Messrs. Bartram & Son are just about to launch a large vessel, and have another ready to put down in the vacated berth. At the adjoining establishment, belonging to the Sunderland Shipbuilding Co., there are four vessels in progress, and one, of much larger dimensions than any now building in the yard, to put down as soon as there is room. Among the latest orders booked is one for a vessel of about 5,000 tons capacity, from a Newcastle firm.

Messrs. Austin have their building berths quite full, and have as much repair work as necessitates the maintenance of operations in this department night and day.

The second launch this year has just taken place at the yard of Messrs. J. L. Thompson & Sons, and it is not improbable that they will be able to launch a vessel each month, in which case they will exceed last year's output considerably.

The deliveries of material at the yard are just now very heavy, and have been so for some weeks past. From this and other signs, it is to be inferred that the firm are well supplied with orders, and that there will be no lessening of the present briskness for many months to come. Messrs. Blumer are also preparing to launch a vessel, and have another to place in the berth as soon as it becomes vacant.

The Strand Shipbuilding Co. have now three berths occupied, this being the first time for many years that the whole of the building space of the yard has been taken up. One of the berths has two hopper barges for the Tees Conservancy Commission, and the other two are occupied by steamers ordered by local owners.

There is a vessel on the slipway undergoing an extensive overhaul, and taking all things into account, the yard has not presented so brisk an appearance at any previous time during the present decade.

Engineering.—Although the whole of the hands who had been on strike were not taken on at the Wearside engine works as soon as the announcement of a settlement was made, a very large proportion of them were reinstated within a few days subsequently, and now it is safe to say that no capable worker is unprovided with employment. At the Palmer's Hill Works there is, in addition to an exceptional pressure of new contracts, several important repair jobs to be dealt with, and the machinery is consequently being run for as long a time as possible. A new "Stockport" gas engine of large power which was put down a few weeks ago has given much satisfaction, enabling the management to turn out work with greater rapidity than would have been possible under the former arrangements. The demand for Dickinson's patent crank shaft continues to be well maintained, and the manufacture of this speciality constitutes no small addition to the general volume of work in the establishment.

At the Southwick Engine Works several vessels have been fitted with their machinery during the month, and there are now some exceptionally important sets of engines being completed in the shops. Among these may be mentioned the engines for the two Japanese steamers building at the Deptford yard, which are intended to develop a very high rate of speed.

The pressure of work at Messrs. Doxford's establishment is probably unprecedented, as there are not only the engines for vessels now under construction in the shipbuilding department to be dealt with, but also the machinery for a number of other vessels that have been contracted for, and are bound to follow in due course. Luckily, the firm's productive facilities are of the first order, and there is little doubt that by running the machinery extra time, they will be able to fulfil all contract obligations.

The North Eastern Marine Co.'s works are kept going very actively with both new work and repairs, and are just now delivering to a London water works an important equipment of pumping machinery.

At the Scotia Engine Works (Messrs. W. Allan & Co.), a large locally-built vessel is receiving her machinery, and one or two others are lying alongside waiting "turns." The firm have recently taken out the engines and boilers from the s.s. *Ambrose*, which has been purchased by Messrs. Cory Bros., for the purpose of being utilised as a depôt or receptacle for coals, to be transhipped as required. The vessel, divested as it is of all interior fittings, should be capable of holding five or six thousand tons of coals, or perhaps more, seeing that she is not intended for oversea travelling, but is to be permanently moored in a suitable situation. At all the smaller works business is brisk, and both iron works and foundries are showing improvement.

At the local forges great activity exists, the works of the Sunderland Forge and Engineering Co. being exceptionally well supplied with orders.

At a special meeting of the Wear Commission, held on the 18th inst., a motion was adopted empowering the Consultation Committee of the Board to take whatever steps they may think necessary in opposition to the granting of Parliamentary powers (now being sought) for the construction of a new deep-water dock and works connected therewith at Seaham Harbour. By the authority of the Board, a petition is being presented against the Bill.

The Hartlepools.—After a period during which it was found

necessary to put the men employed on short time, the old order of things has been restored at the yard of Sir Wm. Gray & Co., and much satisfaction has thereby been caused, not only to the operatives and their dependents, but to the local tradespeople. These yards are among the chief sources of employment at the Hartlepools, and any curtailment of the wage-earning capacity of the thousands of men employed in them could not but have a prejudicial effect on local trade. At the engineering establishments, strenuous efforts are being made to make up for diminished output during the period of the strike, and considering the resources available, we are disposed to think that by the end of the year they will have so far overhauled the shipbuilders as to be able to proceed with the engining of vessels immediately after launching, as was usually done before the strike.

The steel works are now kept briskly going, the output of plates and angles quickly absorbed by local shipbuilding and boiler works. At the docks business is quiet.

Stockton.—The shipbuilding yards at this centre have assumed a more lively appearance since the termination of the engineering dispute, and the aggregate number of men employed has been largely increased. Messrs. Blair & Co.'s Engine Works are going night and day, and other engineering works in the locality are showing decidedly more briskness. Boiler and bridge-building works are generally well off for orders, and local foundries have, during the past couple of weeks, become much busier than they were at the opening of the year.

Middlesbro'.—Sectional labour disputes have, during the past month, interfered somewhat with the usually smooth progress of work at the principal shipbuilding yard at this centre; but matters are now understood to be adjusted, and as orders are plentiful, a prosperous time for the remainder of the year is looked forward to. It is stated that Messrs. Craggs & Son have contracted with a Newcastle shipping company for the supply of a good-sized steamer. Steel works are keeping fully employed, and foundries are showing more activity than was noticeable some time since. At the docks but a limited business is being done.

Darlington.—The various departments of the Darlington Forge Co.'s Works are kept briskly going, and the weekly output of ship and engine castings and forgings is quite equal to that of any former period.

THE MERSEY.

(From our own Correspondent.)

DURING the past month the engineering establishments throughout this district have been gradually getting back into their ordinary operations after the prolonged stoppage. Here and there slight friction has been experienced with the workmen in connection with the new arrangements that have been introduced into the shops, during the lock-out and strike, which may possibly necessitate some conference between representatives of the employers and the workmen in accordance with the terms of settlement, before some of the points of difference can be satisfactorily adjusted. Taking, however, the position all through, the men have settled down to work under the new conditions in a very satisfactory manner, the only difficulty being that engineering establishments have not been able to restart the whole of the men who went out on strike, and at most of the principal works in the district there are still large numbers of men who are daily seeking re-engagement but who for the present cannot be put on. This is, of course, only what was to be generally anticipated, owing to the places of many of the men being permanently filled up during the strike, but at some of the engineering works, by putting on night-shifts, arrangements have been made for giving employment to an extra number of hands. The outlook as regards all branches of the engineering trade is very satisfactory, at any rate, so far as the remainder of the present year is concerned. Although it is known that a good many important orders were lost to this district during the prolonged stoppage, all the tool-making establishments have ample orders on their books to keep them going over the remainder of the year, whilst in the locomotive building trade there is an exceptional pressure of work, which, in some instances, will keep establishments fully occupied well into next year. Stationary-engine builders have also plenty of orders in hand. The same remark applies to boiler-makers, and practically to all the general engineering industries of the district. With regard to marine engineering, the outlook is in every way encouraging, as there are indications of a very active period for some time to come, and all the principal establishments in this district expect to have quite a pressure of orders for all sorts of heavy tools, and for marine engineering requirements generally.

At several of the large engineering establishments that were involved in the recent dispute considerable works extensions are being carried out, which will, when completed, necessitate the employment of an extra number of men. Sir William Armstrong, Whitworth & Co., Limited, of Gorton, are erecting large shops for the manufacture of projectiles, whilst they are also making arrangements for the introduction of milling machinery. Messrs. Beyer, Peacock & Co., Limited, the well-known locomotive builders, are also enlarging their works capacity. The Wests' Gas Improvement Co., Limited, are making an addition to their works, which, when completed, will enable them to double their present output. This new section includes a boiler platers' department and also a shop for the manufacture of retort mouthpieces for gas-works' requirements. They have also put down a new hydraulic plant for stamping mouthpiece lids, chains, and general forgings, and a special boiler heated by the Wilton Patent Furnace, which is working most successfully. The company, it may be added, have in hand both home and foreign orders which are sufficient to give them full employment for the whole of the present year.

Messrs. Laird Brothers, of Birkenhead, have nothing of a special character to report this month. The destroyer *Seal*, built by the firm for H.M. Navy, has completed her official trials, and in the last of the series attained a speed of 30·79 knots as a mean of six runs on the Skelmorlie measured mile. The highest speed recorded was 31·86 in the second mile, and the lowest 29·71 in the fifth mile. The mean speed for the first four miles was 31·03, equivalent to 36¼ miles per hour. The speed in the three hours' continuous steaming was 30·15 knots. After the trial the usual steering tests at full speed ahead and astern were carried out in a most successful manner, the efficiency of the engines, as regards stopping, starting, and reversing, being amply demonstrated. The vessel is now being rapidly brought forward for completion, and delivery at the Devonport Dockyard. The firm are to be congratulated upon the remarkable success attained by them in the building of vessels of the torpedo destroyer class.

In the course of an interesting paper read by Mr. W. P. Adams before the Northern Society of Electrical Engineers, in which he dealt with the subject of the application of electricity for heating purposes, the author remarked that there was one direction in which electric radiators should prove specially valuable, and that was in connection with the heating of ships. The present system mostly in vogue was steam heating, which was a source of constantly recurring trouble and expense. Electric radiators could be fitted on board ship with very much greater ease than steam radiators and piping, and gave absolutely no trouble when once installed. The cost of installation, including the additional generating plant, was very little in excess of the fitting of steam heaters, and in some cases might be even less. As to the advantages of electric heating by radiators, the heat produced was of exactly the quality one could desire; there were no products of combustion that might vitiate the atmosphere, and the radiators could be turned on and off with the same ease as the electric light. They were also very economical in point of heat utilized.

The settlement of the engineering dispute and the resumption of operations at the federated establishments have scarcely as yet had any marked effect upon the iron trade of this district. The tone of the market has perhaps been somewhat more animated, and deliveries on account of old contracts are being taken more freely, but no new orders of any moment are being booked, and prices show no material change. In pig-iron a fair business is reported in some brands, with a tendency to harden upon late rates, but in others the demand is very limited, with prices rather easier, if anything. Local and district makers are generally in a strong position, and, being mostly well sold, show no great anxiety about securing further orders. Lancashire brands are steady at 45s. 6d. for forge to 48s. 6d. for foundry, less 2½ delivered here. For Lincolnshire the basis prices remain at 43s. for forge to 45s. 6d. for foundry, net, delivered Manchester, but makers are in some instances holding out for premiums upon these figures, and in special cases have been able to get 6d. per ton above the list quotations. Derby-

shire brands are practically out of the market, and 48s. to 49s. net cash are the minimum rates at which makers would sell. Outside brands are rather easier, good Middlesbrough foundry ranging from 49s. 4d. to 49s. 10d. net cash, delivered by rail, Manchester; whilst Scotch iron is obtainable at 47s. 3d. for Glengarnock, and 47s. 6d. to 47s. 9d. for Eglinton, net prompt cash, delivered Lancashire ports, and 2s. 3d. more at Manchester Docks. Plentiful supplies of American iron are offering, and ordinary brands are about 6d. cheaper, 45s. representing the full average figures for these, delivered Manchester Docks.

With regard to finished iron, a fairly active business has been coming forward in bars, and prices for these maintain a firm tone. Lancashire qualities are steady at about £5 12s. 6d. to £5 15s., and North Staffordshire £5 17s. 6d. to £6. Sheets meet with only a limited demand, and do not average more than £6 15s. In hoops a moderate business is reported, with association list rates unchanged at £6 10s. for random to £6 15s. for special cut lengths, delivered in the Manchester district and 2s. 6d. per ton less for shipment.

Nut and bolt makers have been busier during the month, orders having come forward more freely, and in some instances they are stiffening up in their prices, but no quotable change in list rates can as yet be reported.

Generally, activity prevails throughout the steel trade, and prices have shown a hardening tendency. Ordinary foundry hematites are not quoted under 57s. 6d. less 2½, delivered Manchester, with special bands 58s. 6d. to 59s. per ton. Local billets are steady at about £4 6s. 3d. net cash. Steel bars range from £6 to £6 5s., and boiler plates about £6 5s. to £6 6s. 3d. delivered Manchester district.

In the metal market there is an active demand for all descriptions of manufactured goods, and works are very busily engaged, but list rates are without quotable change. Delivered in this district they remain as under:—Solid-drawn brass boiler tubes, 7½d.; solid-drawn brass surface condenser tubes, 8½d.; solid-drawn copper tubes, 8¾d.; brazed copper gas and steam tubes, 8½d.; brazed brass tubes, 7¾d.; wrought copper boat nails, 9d.; common rolled brass, 5¾d.; common brass wire, 6d.; and copper wire, 7d. per lb.

In the timber trade business has been quiet. Consumption generally has been small, and stocks of all articles are ample—in some instances excessive. There is not much change in values to report, but prices are difficult to maintain. In East India teak, both logs and planks continue to come forward in excess of the demand, prices have declined, and the stock is much too heavy. There has been no import of greenheart, but with the demand limited, stocks are plentiful.

The coal trade generally shows no appreciable improvement. Housefire qualities have perhaps been in rather better demand, owing to the somewhat colder weather, but the business doing in these is far below the average for the time of the year, and pits, although kept working about five days per week, are not more than disposing of their output, with stocks practically untouched. Prices are without quotable change, but in the open market surplus quantities are offered at under list rates. Steam and forge coals are in fair demand, but so far there has been no material increase of business owing to the settlement of the engineer's strike, and supplies are ample, with prices barely maintained. With regard to engine fuel, some sorts are not over-plentiful, and, if anything, prices show a tendency to harden, but, generally, quotations remain about as last given. At the pitmouth round coal averages 10s. to 10s. 6d. for best Wigan Arley; 8s. 6d. to 9s. for Pemberton 4-ft. and seconds Arley; 7s. for common house coal; 6s. to 6s. 6d. for steam and forge qualities, with engine fuel 3s. to 3s. 6d. for common; 3s. 9d. to 4s. 3d. for medium, and 4s. 6d. to 5s. for the best sorts.

The shipping trade has been tolerably brisk for the greater part of the month, but towards the close there is a falling off, and ordinary steam coal can be readily bought at about 8s. delivered Mersey ports.

The Committee of the British Corporation for the Survey and Registry of Shipping, have appointed Mr. John Mills, of Greenock, as an additional Shipwright Surveyor to the head offices of the society at Glasgow. Mr. Mills was brought up in the yard of Messrs. Scott & Co., and also acted for a number of years as superintendent for the Gulf S.S. Co. The committee have also appointed Mr. James Barr as Junior Assistant in the Engineering Department of the Registry.

BELFAST.

(From our own Correspondent.)

THE most notable feature of the past month is the collapse of the great engineering struggle, which has at last come to an end by the men returning to work a good deal poorer than when they left off—whether they will be wiser in future remains to be seen. Suffice it to say that from beginning to end of the strike the conduct of the men has been most exemplary and now that they have recommenced work everything seems to be running very smoothly. If one can judge from the numbers waiting at the entrances to the various engineering works, however, there seems to be a considerable number not yet employed. This is owing to the fact that the machine work in the various shops must be got forward before fitters, &c., can get employment. Messrs. Workman, Clark & Co. have a full night shift on machines, and will also have a night shift in the erecting department just as soon as pieces of engines are machined, they having several steamers much overdue awaiting machinery, and more steamers ready for launching. The other engineering shops in this city are much in the same position with regard to machine work. Then, another reason for many engine fitters being idle is that Messrs. Harland & Wolff have dispensed with a good number of outside hands, owing to the machinery for vessels not being forward. What a sorry plight the town of Belfast would have been in had the men in the great firm of Harland & Wolff been out along with the others. The consequence to shopkeepers and those who depend in a great measure on the shipbuilding and engineering trades for subsistence have been quite bad enough, so that, whether the policy of the said firm is right or wrong, it has without a doubt been a consummate blessing to the town.

So far as orders are concerned, it is currently reported that Messrs. Workman, Clark & Co., Limited, have booked some very important orders for large steamers, one being an addition to the Star Line of Messrs. J. P. Corry & Co. This vessel will be between 4,000 and 5,000 tons, and should make a handsome addition to their popular line between London and Australia. The others are for the well-known line of Allan Mail steamers running between America and England, and are said to be of large dimensions and high speed. These, with the work at present on hand, will keep this firm well employed for some time to come. With regard to Messrs. Harland & Wolff, if one can judge from the number of orders recorded as booked by this firm, they have more than their fair share of work, so that even supposing that no more orders should come our way, we believe the year 1900 will not see all orders at present in hand executed.

During the past month Messrs. Workman, Clarke & Co. launched the s.s. *Beacon Grange*. This vessel has been built and classed to Lloyd's highest requirements under special survey, and to the Board of Trade regulations for carrying first and second-class passengers. Her principal dimensions are:—Length, 370 ft.; breadth, 47 ft.; depth, 30 ft.; with a gross tonnage of over 4,000, and a deadweight carrying capacity of 6,400 tons on a moderate draught. Eight bulkheads subdivide the vessel into compartments, and she is very completely equipped with eleven powerful winches for rapid discharge of cargo, some of which lift seven tons weight and have derricks suitable for same. The vessel is fitted with refrigerating machinery of the latest kind, and there is a chamber for stowing fruit, butter, fish, etc. The bridge deck is about 100 ft. long and the state-rooms, saloons, etc., are in the fore-end, and are most comfortably fitted up. She can also carry about 280 head of cattle, the fittings for which are portable. She will be lighted throughout by electricity. The machinery for this vessel will also be supplied by her builders, and this makes the fifth steamer built by Messrs. Workman, Clark & Co. for Messrs. Houlder Bros., London.

The new White Star Liner, s.s. *Cymric*, which was built and engined by Messrs. Harland & Wolff, Limited, left Belfast Lough on February 5th for Liverpool, after having a preliminary run in the Lough with a distinguished party on board, including her owners, builders, and several well-known gentlemen interested in the shipping trade from Liverpool. This splendid vessel has by far the largest carrying capacity of any steamer afloat, being 600 ft. long, and 64 ft. beam, and it is said that her enormous size and dimensions excited more interest on her arrival in Liverpool on the following day than any new

steamer has done for years past. She is fitted up for both cabin and steerage passengers, a new feature in the intermediate service of this line. Her propelling power consists of twin engines of the very latest type with four cranks. The saloon is amidships, and is capable of seating nearly 150 persons. The decorations have been carried out in the builder's usual good taste and style, and the state-rooms are fitted with every convenience and comfort for passengers. The smoke-room floor, and all the main passages and entrances, have been laid with Harland & Gray's patent rubber tiles, for the safety of passengers when walking round in bad weather and for reducing the noise. The ship is also capable of being fitted up for a large number of emigrants and has the novelty of a large and commodious smoking-room in a special deckhouse, and also a general sitting-room, with lounges. This, so far as we are aware, is the first vessel provided with such accommodation for steerage passengers, which will, no doubt, be highly appreciated by the travelling public. The steamer is also fitted with all the latest improvements for rapid discharge of cargo and has three compartments fitted up for carrying dead meat and dairy produce, cooled by carbonic acid refrigerating machine. Another new feature of this vessel is that she has very large bilge keels fitted, and should these prove successful it is said the enterprising owners of this line will probably fit most of their steamers with them.

On Thursday morning, Feb. 17th, the fine new steamer *Winifreda* left the harbour and proceeded down Belfast Lough for trial and adjustment of compasses. This steamer has been built and engined by Messrs. Harland & Wolff, Limited, and is for the well-known firm, Messrs. Fred Leyland & Co., Limited, of Liverpool. She is 481 ft. 6 in. long by 52 ft. broad by 35 ft. 6 in. deep, and has a tonnage of 6,833 tons register, and is propelled by triple-expansion engines made by her builders. Her saloon is situated on bridge-deck amidships and extends the full width of the vessel, and can accommodate 120 passengers. The berths are commodious and very handsomely furnished. The steamer is fitted throughout with electric light. Cattle fittings are provided in the upper and 'tween decks for over 800 head of cattle. After the trial the *Winifreda* left for London under the charge of Captain Muir, where she will load cargo for her first voyage.

Messrs. Thos. Dixon & Sons, of this port, have just had a 7,000-ton steamer, named the *Lord Dufferin*, launched from Messrs. Palmer's yard on the Tyne. She is 400 ft. long by 48 ft. 6 in. broad by 31 ft. 6 in. deep, with triple-expansion engines with cylinders 28 in., 46 in. and 76 in., by 51 in. stroke and 180 lbs. pressure. She will form a handsome addition to the tonnage of this port.

NORTH-WEST OF ENGLAND.

(From our own Correspondent.)

Barrow-in-Furness.—A marked revival in shipbuilding activity must be noted in the North-West district. The settlement of the engineers' dispute, and the return of the men to work, has brought about such a scene of activity at local shipbuilding yards as has not been experienced for a considerable time. No new orders have been booked during the month, but builders have not been on the look-out for new work, and owners during the continuance of the strike made known very few of their wants. Now, however, spirited efforts are being made to complete the construction of several ships that should have been delivered a long time ago had it not been for the strike. The shipbuilding department of Messrs. Vickers, Sons & Maxim's yard is still working short time, as the work is so forward that much more cannot be done until the engineers have brought up some of the arrears of their department. In a few weeks the Fleetwood and Belfast steamer *Duke of Cornwall* will be launched. She is almost completed with internal fittings, but has been kept back for her tail end shafts and propellers, which are now being fixed, and the work of building her engines, which are to develop a 19½ knot speed, is receiving first attention. It will probably be April or May before this vessel is on her station. The first-class cruiser *Niobe* is almost completed. Quite an army of engineers are engaged on her at present, and all other departments of the ship are already completed. She is expected to be ready for her trials early in April. By that time it is expected her sister ship, the *Amphitrite*, will be launched. She is very well forward in construction, and already represents a considerable deadweight. H.M.S. *Vengeance*, battleship, is well up in her lower frames, and as a great deal of the material required for this ship is to hand, much progress is being made with her. The other ships in course of construction in the yard are well forward with the exception of the two 7,000-ton Clan Liners, the keels of which have only just been laid. The telegraph cable steamer is just commencing her plating, and a steam yacht for Mr. Platt, of Newark, is being rapidly pushed forward. Now that a good and brisk demand has sprung up for new tonnage, companies like that at Barrow, with but about seven ships on the stocks, and two of these practically ready for launching, will stand a good chance of some of the important new orders that are now offering. Indeed, there is room to put down another dozen ships at Barrow, and it seems to be the policy of Messrs. Vickers to fill the yard with work, as they are busy extending some of their principal departments so as to be able to keep pace with a fuller building programme. The engineering shop, one of the largest in the country, and possessing some of the most modern machinery, is to be increased from three bays to four. This, with the new tools that are to be introduced, will enable Messrs. Vickers largely to increase their output of I.H.P., especially as other departments are also being enlarged.

The Barrow Co. is one of the thirteen firms that have been asked to tender for the four belted cruisers required by the Admiralty from private builders. Other important tenders have been receiving attention, and it seems probable that not only will there be a good demand for commercial tonnage, some of it of the highest class, but also for warships for the home and other Governments. The torpedo-boat destroyer *Otter* has had a steam trial on the Clyde, and attained the unprecedented speed of 31·56 knots. She is one of the 30-knotters. The *Bittern* is ready for her trials, and the *Avon* and *Leopard* are almost ready to follow. Some difficulty has been experienced in ascertaining the actual type of propeller these boats need, but now that a proper pitch has been found the rest of this quartette of 30-knotters are expected to pass through their trials without difficulty or delay. In the repair line the only orders in hand at present are the *Clan Mackenzie* which is being tripled, and the Great Western Railway Co.'s paddle steamer *Limerick*, which has come to Barrow for overhaul.

West Cumberland.—There is a steady business in shipbuilding in the West Cumberland district, but the ups and downs of the market have no effect materially on the shipbuilding trade of this district, as there seems a constant run of work, and if orders are not to hand, builders confine themselves to small craft generally, they are always safe in building new craft of a similar type to that which has always engaged their attention. They are well sold forward at present.

Shipbuilding Material.—There is a marked improvement in the demand for steel for shipbuilding purposes, and the mills in this district which are engaged in the manufacture of plates thick and thin, sections, &c., are all as busy as they can possibly be, and makers are not only already very fully sold forward, but there are indications that builders will require fuller deliveries in the future, and with this prospect it is probable that means will be adopted to increase the output.

Hematites.—The hematite pig-iron trade is very brisk, and a steady run of trade is being done, especially in Bessemer mixed numbers. Makers quote 49s. to 51s. per ton net f.o.b., while warrant iron is at 49s. 3d. net cash sellers, 49s. 2½d. buyers, with a rising market. Stocks are firm and well held. They now represent about 185,000 tons in hematite stores. Makers hold practically no stocks at all.

Shipping.—The shipping trade is very briskly employed at West Coast ports, and the exports of metal are growing considerably. Pig-iron has been cleared this year to the extent of 61,068 tons, and steel 77,700 tons, as compared with 41,307 tons of pig-iron and 56,731 tons of steel in the corresponding period of last year, showing an increase of 19,761 tons of pig-iron and 20,969 tons of steel.

Surveyors.—The committee of The British Corporation for the Survey and Registry of Shipping have just appointed Mr. John Thorpe, of Baltimore, and Mr. Hugh R. Hearson, of Shanghai, to represent the society at the ports named, as non-exclusive surveyors.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—ENGLISH.

Catalonia.—On January 15th there was launched at North Shields an iron steam ketch of about 140 tons. She is owned by the Grimsby Alliance Steam Fishing Co., Grimsby, and was named the *Catalonia*.

Alaska.—On January 15th there was launched at North Shields an iron steam ketch of about 142 tons. She is owned by the Grimsby Co-operative Co., Limited, and was named the *Alaska*.

Hornsey.—On January 22nd there was launched at Sunderland a steel steamer of about 1,386 tons. She is owned by Messrs. W. Cory & Son, Limited, London, and was named the *Hornsey*.

Shetland.—On January 24th there was launched at Goole, an iron steam ketch of about 150 tons. She is owned by the Hull Steam Fishing and Ice Co., Limited, Hull, and was named the *Shetland*.

Federal.—On January 25th there was launched at Beverley, an iron steam ketch of about 188 tons, named the *Federal*. She is owned by the East Coast Steam Trawling Co., Limited, Hull.

Hawk.—On January 27th there was launched at Hull an iron steam ketch of about 185 tons, named the *Hawk*. She is owned by the St. Andrew's Steam Fishing Co., Limited, Hull.

Roker.—On February 4th Messrs. Short Bros. launched from their works at Pallion a steel screw steamer of the following dimensions:—Length, 360 ft.; breadth, 47 ft.; depth, moulded, 27 ft. 4 in.; and having a deadweight carrying capacity of 5,700 tons, on Lloyd's summer freeboard. Constructed to the highest class in Lloyd's Register, with one deck laid, the vessel has been designed to meet all modern improvements for the quick loading and discharging of general cargoes. There are four cargo holds with a large hatchway to each, with six powerful steam winches. The double bottom, which is continuous fore and aft, is divided into six compartments for trimming purposes, and is so arranged to give ample immersion to the propeller when in ballast. The vessel is being fitted with triple-expansion engines by Messrs. William Allan & Co., Limited, having cylinders 25 in., 40 in., and 67 in. respectively, with a stroke of 45 in., steam being supplied at 160 lbs. pressure by two large boilers. She is built to the order of Mr. James Westoll, of Sunderland, and was christened *Roker*.

Brittany.—On Monday afternoon, February 7th, Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 344 ft. 6 in.; beam, extreme, 43 ft.; depth, moulded, 26 ft. 6 in. This vessel, which has been built to the order of Messrs. David MacIver & Co., of Liverpool, for their South American trade, will take Lloyd's 100 A1 class, and has been built under special survey. She is of the spar-deck type, with poop, bridge, and forecastle, accommodation for captain and officers being provided in houses on bridge deck. A cellular double bottom for water ballast is fitted fore and aft, also an after-peak tank. Equipment includes stockless anchors, steam steering gear, double derricks, and all modern appliances for facilitating speedy loading and discharging. The engines, by Messrs. Blair & Co., have cylinders 24 in., 40 in., and 66 in., with a stoke of 45 in., steam being supplied by two single-ended boilers, having a working pressure of 160 lbs. During construction the vessel has been overlooked by Mr. P. H. Roscoe, the owners' superintendent engineer. On leaving the ways she was christened *Brittany* by Mrs. David MacIver.

Goolistan. — On Monday, February 7th, Messrs. William Gray & Co., Limited, launched the fine steel screw steamer *Goolistan*, which they have built for Messrs. Frank C. Strick & Co., Limited, of Swansea and London. She is a sister vessel to the s.s. *Kordistan*, recently launched for the same owners. Her principal dimensions are:—Length, over all, 316 ft.; breadth, extreme, 43 ft.; and depth, moulded, 20 ft. 10 in.; and her class will be the highest at Lloyd's. The type is that of partial awning deck, with raised quarterdeck and poop, and the rig fore-and-aft schooner with telescoping masts. Very tasteful cabin accommodation will be provided under the poop, consisting of saloon, state-room, captain's and officers' rooms. The engineers' quarters are amidships, and the crew's berths forward. The sides of the vessel are supported by strong web frames taking the place of hold beams so far as possible, and leaving a clear hold for storing bulky goods. A cellular double bottom is fitted, and also an after-peak tank for water ballast, and iron grain divisions, while the steam windlass, steam steering gear amidships, hand screw gear aft, steam winches, marine-type donkey boiler, and the whole of the outfit are of the most approved description. The machinery for the *Goolistan* will be supplied by the Central Marine Engine Works of Messrs. William Gray & Co., Limited, the engines being of the triple-expansion type, with cylinders 23 in., 36½ in., and 62 in. diameter, and a piston stroke of 39 in. to receive steam from a large steel multitubular boiler, working by forced draught at a pressure of 160 lbs. per square inch. The vessel and machinery have been constructed under the superintendence of Mr. Archibald Walker on behalf of the owners, and the ceremony of naming the *Goolistan* was gracefully performed by Miss Baines, of Bradgate, West Hartlepool.

Steam Trawler.—On February 7th Messrs. Edwards Bros. launched at North Shields a steam trawler to the order of the Hartlepools Steam Fishing Co., Limited, of the following dimensions:—Length, b.p., 105 ft.; breadth, 20 ft. 9 in.; depth, moulded, 11 ft. 10 in. Messrs. H. S. Edwards & Sons, South Shields, are building the engines, the cylinders being 12 in., 20 in., and 32 in. diameter, with 24 in. piston stroke.

Cayo Largo.—On February 7th Messrs. John Readhead & Sons launched from their shipbuilding yard, West Docks, South Shields, a new screw steamer named *Cayo Largo*, built to the order of the Cuban Steamship Co., Limited, London, and is intended for the American and West Indian trades. This vessel is of the spar-decked type, with long poop, long bridge, and topgallant forecastle, and is of the following dimensions:—Length, 346 ft.; breadth, 45 ft.; depth, moulded, 28 ft.; and is classed 100 A1 at Lloyd's under special survey. The steamer is provided with triple-expansion engines, also built by Messrs. John Readhead & Sons, with cylinders 25 in., 42 in. and 68 in., by 45 in. stroke, steam being supplied by two extra large steel boilers working at a pressure of 160 lbs. per square inch.

Chatham. – On February 7th Messrs. Ropner & Son launched at Stockton-on-Tees, a steel screw steamer of the following dimensions, viz.:—Length, b.p, 280 ft.; breadth, extreme, 42 ft.; depth, moulded, 20 ft. This steamer has been built to the order of the Britain Steamship Co., Limited, and is the seventh steamer built by Messrs. Ropner & Son for the same owners. She is fitted with the builders' patent "trunk," full poop, bridge, and topgallant forecastle. The saloon and cabins for captain and officers will be in the poop, and accommodation for engineers will be provided under the bridge deck, the crew being berthed in the forecastle, as usual. She has double bottom on the cellular principle for water ballast, and has been designed to carry a deadweight cargo of about 3,200 tons on Lloyd's summer freeboard, on a light draught of water. She will be fitted with a set of powerful triple-expansion engines by Messrs. Blair & Co., Limited. The christening ceremony was gracefully performed by Miss Mabel Ropner, of Preston Hall, who gave her the name of *Chatham*.

Duke of Wellington.—Messrs. Cook, Welton, & Gemmell launched from their yard at Hull lately, a new steam trawler for the National Steam Trawling Co., Limited, Hull, being the third vessel built for the company. The engines and boiler are to be supplied by Messrs. C. D. Holmes & Co., Hull. The vessel was named *Duke of Wellington* by Miss Alice Howard, daughter of Captain Howard, manager of the National Steam Trawling Co.

Edenhall. — On February 8th, at high water, Messrs. Irvine's Shipbuilding and Dry Docks Co., Limited, launched a handsomely-modelled steel-screw steamer of 4,250 tons deadweight carrying capacity, on Lloyd's summer freeboard. This vessel is built to the order of Messrs. J. E. Guthe & Co., of West Hartlepool, and is classed to Lloyd's highest class, built under special survey, and is of the following dimensions:—313 ft. by 44 ft. by 23 ft. ½ in., having poop, bridge, and topgallant forecastle, cellular double bottom for water ballast, all fore and aft and in the after peak. Special regard has been paid for dealing with rapid loading and discharging of cargoes, for which extra large hatchways have been fitted with powerful winches of the company's own make, and double derricks to each hatch, together with all the latest improvements in the entire outfit of the vessel, including steam-steering gear

improved steam windlass, &c. The boats will be placed on a platform deck overhead, and forming an awning for the protection of crew in tropical climates. The engines are of the triple-expansion type, and will be supplied by Messrs. William Allan & Co., Limited, Sunderland. As the vessel left the ways the christening ceremony was gracefully performed by Miss Annie Guthe, daughter of the owner, who named the ship *Edenhall*. The hull and machinery have been built under the personal supervision of Mr. Robert Craig, the owners' superintendent. We may say that this is the first vessel launched by Irvine's Shipbuilding and Dry Docks Co., Limited, since the extensive improvements to their premises, the yard having been considerably extended, and is now capable of producing vessels up to 10,000 tons. The firm have two other vessels on the stocks, one ready for launching and the other under construction, and the keel of a fourth ready to be placed on the blocks which the *Edenhall* has just vacated. Amongst the various alterations and improvements made in the yard, we noticed that electricity has been introduced largely for power and lighting purposes, also a complete new plant for frame turners, in a large building constructed on iron girders, a portion of the upper part forming a spacious moulding loft for the laying off of new vessels at the north end of the yard, with scrieve-boards immediately below, has been added. In addition to the extension of yard for new vessels, the graving dock has undergone extensive alterations and enlargements, and is now capable of taking large vessels. Special powerful pumps, supplied by Messrs. Drysdale, which will pump the dock dry within two hours from the time a vessel enters, have been fitted.

Hohenfels.—On Tuesday, February 8th, Messrs. Wigham Richardson & Co. launched from their Neptune shipyard, Newcastle-on-Tyne, a steel screw steamer, which they are constructing to the order of the Deutsche Dampfschfffahrts Gesellschaft "Hansa," of Bremen. The steamer is 432 ft. in length by 54 ft. beam, and is being built to Lloyd's highest class. Her decks are of teak and she has a limited amount of passenger accommodation. The engines and boilers, which are of large power, are also being constructed by Messrs. Wigham Richardson & Co., the former being of the quadruple-expansion type, balanced on the well-known Yarrow, Schlick & Tweedy system. The arrangements for working the cargo are of the most complete description, comprising eight steam winches, two steam cranes, electric light, &c. At the launch the owners were represented by Mr. Wulff, their superintendent engineer. As the vessel left the ways she was named the *Hohenfels*, the christening ceremony being gracefully performed by Miss Laura Richardson, of South Ashfield, Newcastle-on-Tyne.

Lord Dufferin.—On February 8th there was launched from the Jarrow yard of Messrs. Palmers' Shipbuilding and Iron Co., Limited, a large screw steamer, built to the order of Messrs. Thomas Dixon & Sons, of Belfast. Her dimensions are as follows:—Length between perpendiculars, 400 ft.; breadth, 48 ft. 6 in.; depth, moulded, 31 ft. 6 in. The vessel will be rigged as a fore-and-aft schooner and is of the three-deck type, with poop, bridge and topgallant forecastle; and is built to take the highest class in Lloyd's Registry. The upper and main decks are of steel all fore and aft, and the poop, bridge and forecastle decks are of wood. The space under the bridge is left clear for cargo or bunkers, and accommodation for captain, officers and engineers is provided in steel deck-houses on the top of the bridge deck. The poop is fitted up for the seamen and firemen at the sides, and for the steering gear in the centre. The topgallant forecastle has steel side houses for the accommodation of petty officers, store-room, &c., and is left open in the centre. A double bottom for water ballast is fitted all fore and aft. The vessel will be finished and fitted out as a first-class cargo steamer, and all the most modern arrangements for the rapid loading and discharging and safe carriage of grain and other cargoes, and for working the vessel, will be provided complete. The vessel has been designed to lift 7,100 tons deadweight on Lloyd's summer draught. The engines, which are also being constructed by the Palmer Co., are of the triple-expansion type, with cylinders 28 in., 46 in. and 76 in. by 51 in. stroke, steam being supplied by two boilers 15 ft. diameter by 17 ft. 6 in. long, with a working pressure of 180 lbs. As the vessel left the ways she was gracefully christened the *Lord Dufferin* by Mrs. Arthur, wife of Captain Arthur, superintendent for the owners. After the launch the company adjourned to the model-room for refreshments, when the usual congratulatory toasts were honoured.

Algorta.—On Wednesday, February 9th, Messrs. Wm. Gray & Co., Limited, launched the fine steel screw steamer *Algorta*. She is of the following dimensions, viz.:—Length, over all, 285 ft.; breadth, 41 ft. 6 in.; depth, 20 ft. 2 in., and has been built to the order of Ramon de la Sota, of Bilboa. She will take Lloyd's highest class, and her deck erections consist of a poop, raised quarterdeck, bridge, and topgallant forecastle. The saloon and accommodation for captain and officers will be fitted in the poop, the engineers' berths amidships, and the crew's quarters forward. The vessel is built on the web frame system with cellular double bottom for water ballast, and after-peak ballast tank, steam winches, donkey boiler, steam steering gear amidships, screw gear aft, steam windlass, schooner rig with patent folding masts, boats on beams overhead, and generally equipped in a first-rate manner for a cargo steamer. The engines are of the triple-expansion type working on three cranks. They are supplied by the Central Marine Engineering Works of William Gray & Co., Limited. The cylinders are 21½ in., 34 in. and 57 in. diameter, and the piston stroke 39 in., and two steel boilers will give an ample supply of steam at a working pressure of 160 lbs. per square inch. The vessel has been built under the superintendence of Captain Ricardo de Goicoechea, on behalf of the owners, and the ceremony of naming her *Algorta* was gracefully performed by Miss E. Stewart, of Middlesbrough.

Meridian.—On Wednesday, February 9th, Messrs. Doxford & Sons, Limited, Sunderland, launched from their yard the turret-deck steamer *Meridian*, which vessel has been built to the order of Messrs. George Horsley & Son, Hartlepool. This is the fourth steamer of this type which Messrs. Doxford have built for the same owners, her dimensions being 340 ft. by 45½ ft. by 27½ ft., and the deadweight capacity 5,600 tons. The machinery consists of triple-expansion engines, having cylinders, 24 in., 39 in. and 66 in., with 45 in. stroke, and two boilers 15 ft. 9 in. diameter by 10 ft. 6 in. long. The christening ceremony was performed by Mrs. Horsley, of Hartlepool.

H.M.S. Bullfinch.—On February 10th H.M.S. *Bullfinch*, 30-knot torpedo-boat destroyer, was launched at Hull from the Yard of Earle's Shipbuilding and Engineering Co., Limited, and may shortly be expected to be ready for her official trials, as her machinery is nearing completion and her boilers were on board at the time of launching. The naming ceremony was undertaken by Mrs. Seaton, wife of the managing director of Earle's.

Thomas Scarr.—On February 12th there was launched from the yard of Mr. Joseph Scarr, Grovehill, Beverley, a steel keel of the following dimensions, viz.:—Length, 61 ft. 6 in. between perpendiculars; 15 ft. 6 in. beam, extreme; 7 ft. 9 in. depth amidship, with a carrying capacity of 130 tons. The vessel, built to the order of Mr. David Holgate, of Beverley, was christened *Thomas Scarr* as she left the ways, by Miss Scarr daughter of the builder.

Bodlewell.—On February 18th Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands shipbuilding yard, Sunderland, launched this vessel. She has been built to the order of Messrs. The Tyzack and Branfoot Steam Shipping Co., Limited, Sunderland. The vessel is built on the three-deck rules, her principal dimensions being:—Length, between perpendiculars, 350 ft.; breadth, extreme, 47 ft.; depth, moulded, 26 ft. 8 in. She has been specially constructed for the Atlantic trade, and has every facility for the rapid handling of cargoes. The engines are constructed by Messrs the North-Eastern Marine Engineering Co., Limited, of Sunderland. The vessel was gracefully christened by Mrs. Neilson, of Boldon, and is the ninth vessel built by Messrs. Thompson for these owners.

Inglefield.—On February 21st Messrs. Richardson, Duck & Co. launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 320 ft.; breadth, extreme, 44 ft.; depth, moulded, 22 ft. 10½ in.; gross tonnage, 2,400 tons. This vessel has been built to the order of the Field Steamship Co., Limited. of Stockton-on-Tees, will class 100 A1 in Lloyd's register, and has been built under special survey. She is of the single-deck type, with poop, bridge, and topgallant forecastle. Captain and officers' accommodation is fitted up in poop aft, engineers' in after end of bridge, and crew in topgallant forecastle. A cellular double bottom for water ballast is fitted throughout, also an after peak, tank, and equipment includes steam windlass, stockless anchors, steam steering gear, four steam winches, large horizontal multitubular donkey boiler, &c. The engines, by Messrs. Blair & Co., have

cylinders 22½ in., 37 in., 61 in. by 42 in. stroke, steam being supplied by two single-ended boilers having a working pressure of 160 lbs. As the vessel was leaving the ways she was christened *Inglefield*, by Miss Binnington, of Stockton.

Ijstroom.—On Monday afternoon, February 21st, there was launched from the Southwick yard of Messrs. Robert Thompson & Sons a very finely-modelled steamer, to the order of the Holland Steamship Co., of Amsterdam. She is specially designed for the fruit trade. Her dimensions are:—Length, 238 ft. over all; breadth, extreme, 32 ft. 3 in.; depth, moulded, 17 ft. 6 in., and is built to the highest class of Bureau Veritas, with cellular bottom and peaks for water ballast, full poop aft, fitted with insulated ice-room and cheese-room, shelter deck covering the engine and boiler space, with four large lifeboats, also forward bridge for captain and officers, topgallant forecastle for sailors, firemen, and petty officers, accommodation for captain and officers being fitted up in solid oak, a steam heater being fitted to each berth throughout the ship; three large hatchways with two large steam cranes to each hatch for rapid loading and discharging, large cargo doors being fitted in sides. Steam steering gear fitted on forward bridge, and connected with rods placed on gangway, in centre of vessel, to a round tiller on rudder head; also a complete installation of electric lighting by Messrs. Hayward, Tyler & Co., Limited, of London. The engines are by Messrs. George Clark, Limited, with very large boilers to drive the vessel 13 knots an hour loaded. During construction, the ship and machinery have been superintended by Mr. M. Fenanga, of Amsterdam. As the vessel left the ways, she was gracefully christened the *Ijstroom* by Miss Lowes, of Sunderland.

Rapidan.—On February 22nd Messrs. Furness, Withy & Co., Limited, launched from their Middleton Shipyard, West Hartlepool, a fine large steel screw steamer to the order of Messrs. The Chesapeake and Ohio Steamship Co., Limited, London (of which firm Sir Christopher Furness is chairman). She is intended for the cargo and cattle service between London, Liverpool, and Newport News. Her dimensions are as follows:—Length, over all, 490 ft.; beam, extreme, 56 ft.; depth, moulded, 35 ft. 6 in. Her deadweight carrying capacity will be about 11,500 tons, with a measurement capacity of about 18,000 tons. She is built throughout of Siemens-Martin steel to Lloyd's 100 A1 class, although, in many instances, the scantlings far exceed the society's requirements. She is built on the web frame principle, with cellular double bottom for water ballast, with all the latest appliances for filling and discharging the tanks. The whole of the main framing of the vessel is of strong sectional material, the topsides being as strong as any other portion. The hull is divided into eight compartments by seven watertight bulkheads, fitted in accordance with the Board of Trade requirements. Her surplus buoyancy is so great that if any two compartments were open to the water the efficient pumping arrangements with which she is fitted would be able to keep her afloat. She will have six large cargo hatches and ten powerful steam winches, with a special arrangement of derricks for the quick manipulation of cargo, the vessel being able to discharge cattle and cargo and do her bunkering at the same time, without one operation interfering with another. The whole of the cargo holds are controlled by steam fire appliances, so that in case of fire in any compartment it could be readily extinguished. Stockless anchors are fitted hauling into hawse pipes. She has two complete steel decks, and, in addition, a steel shade deck above, with a bridge 125 ft. long on top of it. Arrangements have been made for carrying over 800 head of cattle under the shade and bridge decks. She will be rigged as a four-masted fore-and-aft schooner. The saloon and cabin, providing accommodation for the captain, is handsomely finished in polished hardwood. An installation of electric light will be fitted throughout the vessel on the double-wire system. The vessel will be fitted with triple-expansion engines by the North Eastern Marine Engineering Co., Limited, Wallsend-on-Tyne, which have been designed to suit the requirements of the heavy Atlantic trade, the diameter of the cylinders being 28 in., 46 in., 75 in. by 54 in. stroke. Steam will be supplied by four single-ended boilers, 15 ft. 6 in. diameter by 10 ft. 6 in. long and 180 lbs. working pressure. On leaving the ways, the ceremony of christening her *Rapidan* was gracefully performed by Mrs. Henry Withy, Brantford House, West Hartlepool. This is the fourth steamer built by Messrs. Furness, Withy & Co., Limited, to the order of the Chesapeake Co., Limited.

LAUNCHES.—SCOTCH.

Yarta.—On January 24th there was launched from the yard of Messrs. Hawthorns & Co., Limited, Leith, a finely-modelled screw steam yacht of 350 tons, built to the order of Captain Wiggins, of Sandhills, Hants. She is provided with all the latest appliances for a vessel of her type, including steam steering gear, steam windlass, electric light, &c. She will be fitted by the builders with triple-expansion engines, having cylinders 13 in., 21 in., and 34 in. by 24 in., working at a boiler pressure of 170 lbs. As she left the ways she was christened *Yarta* by Mrs. Wiggins, wife of the owner. The vessel has been designed and built under the superintendence of Mr. A. H. Brown, naval architect, London.

H.M.S. Argonaut.—On January 24th the Fairfield Shipbuilding Co. launched at Govan H.M. first-class cruiser *Argonaut*, which is one of four at present under construction for the British Government. The vessel is—Length over-all, 462 ft. 6 in.; length, between perpendiculars 435 ft.; extreme breadth, 69 ft.; displacement, 11,000 tons. The hull is built generally of Siemens-Martin steel, all tested to Admiralty requirements. Her armament consists of four 6-in. quick-firing guns, with shields—two of which are on the upper deck and two on the forecastle—12 quick-firing guns of the same calibre in Harveyed casemates—eight on the main deck and four on the upper deck—and 14 12-pounder, and a large number of smaller and machine guns. There are also two torpedo tubes forward, discharging under water. Under and above the protective deck for the length of the boiler space the compartments are formed by longitudinal bulkheads for the stowage of coal, and these compartments, with cross bunkers, form a complete coal protection to the boilers. The coal capacity at the normal draught is 1,000 tons, but provision has been made for carrying above that quantity should occasion require. The accomodation includes a suite of apartments for an admiral, and a complete complement for about 700 officers and men. The *Argonaut* will be rigged with two masts, each fitted with a platform for working the electric searchlights, and all the usual signalling appliances. She will be fitted with four funnels. The propelling machinery consists of two sets of triple-expansion engines, and steam will be supplied by 30 water-tube boilers and economisers of the latest Belleville type. The steam pressure at the engines is 250 lbs., the I.H.P. of the machinery 18,000, and the speed which the vessel has to attain under ordinary conditions is 23½ knots. The service customary at launches of British warships was conducted by the Rev. Dr. John Macleod. The Countess of Hopetoun, instructed by Mr. Sharer, released the ship, and as the mass of steel moved towards the water her ladyship performed the naming ceremony. The launch was a most successful one.

Craigrowan.—On January 25th Messrs. A. Rodger & Co., shipbuilders, Port-Glasgow, launched a steel screw steamer of 2,650 tons gross register, to carry 4,300 tons deadweight. Dimensions:—Length, 314 ft. breadth, 44 ft.; depth, 23 ft. 3 in. Messrs. Hall-Brown, Buttery & Co., Glasgow, will supply the machinery. The owners are Messrs. Russell, Huskie & Co., Leith, and the ceremony of naming the vessel *Craigrowan*, was gracefully performed by Mrs. Huskie, Strathhouse, Linlithgowshire.

Sarah Brough.—On January 27th the Ailsa Shipbuilding Co., Troon, launched from their yard a steel screw steamer of the following dimensions:—Length, over all, 139 ft.; length, between perpendiculars, 132 ft.; breadth, moulded, 23 ft.; depth, moulded, 11 ft. 6 in. The steamer is to be fitted with compound surface-condensing engines, having 17 in. and 35 in. cylinders, and a piston stroke of 24 in., by Messrs. Ross & Duncan, Glasgow. She was gracefully named the *Sarah Brough* by Mrs. Brough, of Warrington. She is owned by the Zillah Shipping and Carrying Co., Limited, of Warrington, and is a similar, but larger ship to the s.s. *Priscilla*, built for the company in 1896.

Ferry Boat.—On February 1st there was launched from the yard of Mr. D. M. Cumming, Blackhill Dock, Glasgow, a steel screw ferry boat, 60 ft. by 13 ft. by 6 ft. 9 in. moulded for passenger traffic in the Royal Albert Dock, London.

Nottingham, Oldham and Plymouth.—On February 4th Messrs. Mackie & Thomson, Govan, launched the *Nottingham*, *Oldham*, and *Plymouth*, screw fleeters of 160 tons, built to the order of Messrs. Hagerup, Doughty & Co., Grimsby. Engines of the triple-expansion type will be supplied by Messrs. Muir &

Houston, Kinning Park. The *Nottingham* was launched by Miss Meikdejohn, Stirling; the *Oldham* by Mrs. M'Kenzie, Coatbridge; and the *Plymouth* by Mrs. Matthew Robin, Glasgow.

Conisbro' Castle.—On February 7th the Dundee Shipbuilders' Co., launched from Panmure shipyard a steam trawler, which they have built for the Crampon Steam Fishing Co., Limited, Grimsby. Her dimensions are:—Length, 112 ft.; breadth, 21 ft.; and depth, 12 ft.; and tonnage about 190 tons. She is to be fitted by Messrs. Cooper & Greig with triple-compound engines of 11½ in., 19 in., and 32 in. diameter by 22 in. stroke. As the vessel left the ways she was christened *Conisbro' Castle*. She is fitted as a steam liner and steam trawler combined, and is to be engaged principally on the Iceland, Faroe, and Rockall fishing grounds

Cidade de Porto de Moz.—On February 7th there was launched from the yard of Messrs. Murdoch & Murray, shipbuilders, Port-Glasgow, a steel twin-screw steamer of 433 tons gross register, for cargo and passenger traffic on the river Amazon. The steamer is similar to several others built by the same firm for the same trade. On leaving the ways the vessel was named *Cidade de Porto de Moz*. After the launch the steamer was towed to Glasgow, where she will have two sets of triple-expansion engines fitted by Messrs. David Rowan & Sons.

Steam Hopper Barge.—On February 7th Messrs. Wm. Simons & Co., Limited, Renfrew, launched from their yard the second of two powerful steam hopper barges for the Mersey Docks and Harbour Board. Dimensions:—Length, 205 ft.; breadth, 35 ft.; depth, 16 ft. 3 in., having a hopper capacity to carry 1,200 tons of dredgings. The vessel is propelled by two sets of independent triple-expansion engines of about 1,200 I.H.P., supplied by steam from two return tubular boilers, working pressure 160 lbs. Steam appliances are fitted to work the hopper doors by steam power from independent engines, placed at fore-and-aft end of hopper; also steam windlass forward and steam capstan aft. Cabins are placed at aft end of vessel for the accommodation of the officers, and at fore end for the seamen and firemen. These vessels are constructed under the direction of Mr. A. G. Lyster, engineer for the Dock Board, Liverpool.

Magpie.—On February 8th Messrs. A. & J. Inglis launched from Pointhouse shipyard a new steamer for Messrs. G. & J. Burns's mail service between Scotland and Ireland. This vessel, which will afford luxurious accommodation for passengers, will take her station this summer. She has been named *Magpie*, and a sister vessel, to be named the *Vulture*, is already in progress on the blocks she recently vacated.

Louga.—On February 8th Messrs. Ramage & Fergusont Limited, launched from their yard a screw steamer of abou 1,000 tons, built to the order of Thos. Cowan, Esq., Granget mouth. This vessel has a quarterdeck, bridge and topgallant forecastle, and has water ballast in a double-bottom, except under the engines and boilers, and is the third steamer buil for Mr. Cowan by the same builders. The principal dimen. sions are:—213 ft. between perpendiculars by 32 ft. by 14 ft- 6 in. depth, moulded; while the machinery consists of triple. expansion engines with cylinders 17 in., 27 in., and 44 in diameter, by 30 in. stroke, steam being supplied from a large steel boiler working at 160 lbs. pressure. All the usual appliances for the rapid loading and discharging of cargo have been fitted on board this steamer, and in all respects she is most thoroughly equipped for the trade for which she is intended. On leaving the ways the vessel was named *Louga* by Miss Nora Fairley, Avonhall, Grangemouth, and at the lunch afterwards the toasts usual on such occasions were duly honoured.

Mars.—On February 9th Messrs. Cumming & Ellis launched at Inverkeithing, to the order of a Continental firm, an auxiliary three-masted schooner, to carry 600 tons deadweight on a draught of 11 ft. 7 in., the principal dimensions being 160 ft. by 28 ft. by 12 ft. 6 in. The vessel has been built to the 100 A1 class at Lloyd's under special survey. The vessel is fitted with auxiliary engines capable of driving her at six knots. She was christened *Mars*.

Areverga.—On February 10th Messrs. Robert Duncan & Co., Limited, Port-Glasgow, launched a small steel screw steamer named *Areverga*, to the order of Mr. Alexander Kerr, Loch Ranza. The steamer, which has been built for the Arran coasting trade, will be engined by Messrs. Campbell & Calderwood, Paisley.

Florence.—On February 10th there was launched from the yard of Messrs. S. M'Knight & Co., Limited, Ayr, a steel screw-steamer of about 400 tons deadweight, built to the order of Capt. William Rowland, of Runcorn and Liverpool, to be employed in his general carrying trade. Her dimensions are:—Length, between perpendiculars, 142 ft.; breadth, moulded, 24 ft.; depth, moulded, 11 ft.; built under special survey to class 100 A1 at Lloyd's. Raised quarter-deck type, bridge and top-gallant forecastle. Accommodation for captain and officers is handsomely fitted in hardwood. The vessel will be propelled by compound surface-condensing engines, having large boiler, constructed by Messrs. Ross & Duncan, Glasgow. She is provided with all the latest improvements and has every facility for the efficient loading and discharging of cargo. The vessel as she left the ways was gracefully christened *Florence* by Miss Florence Rowland, daughter of the owner.

Kildalton.—On February 10th Messrs. J. M'Arthur & Co., Paisley, launched from their shipbuilding yard the first of two steel screw-steamers they are building to the order of Messrs. Paton & Henry, Glasgow, managers of the Glasgow Steam Coasters Co., Limited. These steamers have been specially designed and built for the coasting trade, and are exceptionally strong and well equipped, being fitted with all the latest and best appliances for safe and quick handling of vessel and cargo. Powerful compound surface-condensing engines to drive steamers at a high speed are to be fitted by Messrs. Shanks, Anderson & Co., Pollokshaws. The steamer launched was named *Kildalton* by Miss Daisy Dawson, daughter of Mr. Peter Dawson, chairman of the Coasters Co.

Benledi.—On February 12th there was launched from Messrs. Alex. Hall & Co.'s shipbuilding yard at Aberdeen, a steam-screw trawler, built to the order of the North of Scotland Steam Fishing Co., Limited. The vessel, which was named the *Benledi*, is 110 ft. in length, 20 ft. 3 in. in breadth, and 11 ft. in depth. She will be fitted with triple-expansion engines of 45 H.P.

Sea Foam.—On February 17th there was launched from the shipbuilding yard of Messrs. John Duthie & Sons, Aberdeen, a steam trawler built to the order of Mr. T. R. Oswald, Milford Haven. The vessel, which was named the *Sea Foam*, is 118 ft. in length, 20 ft. in width, and 12 ft. in depth. She is fitted with triple-expansion engines of 320 I.H.P.

LAUNCH.—IRISH.

Beacon Grange.—On January 25th Messrs. Workman, Clarke & Co. launched at Belfast the screw steamer *Beacon Grange*, of the following dimensions, viz.:—Length, 370 ft.; breadth, 47 ft.; depth, 30 ft.; with a gross tonnage of over 4,000. She is the fifth vessel built for Messrs. Houlder Brothers Co.'s line of steamers by this firm, and brings the tonnage carried by Houlder Brothers constructed by this firm alone up to 44,000 tons. This steamer, like her predecessors, is adapted by special design and equipment for the various countries she will trade to, both as a cargo and passenger steamer. Lloyd's highest class and Board of Trade requirements for passengers are complied with throughout, and a double bottom is provided extending fore and aft. The vessel is also subdivided by eight steel bulkheads, three of these enclosing the machinery and coal bunkers. She will be lighted throughout by electricity.

TRIAL TRIPS.

Trelyon.—On January 26th the new screw steamer *Trelyon*, built and engined by Messrs. John Readhead & Sons, South Shields, for Messrs. Edward Hain & Sons, St. Ives, Cornwall, was taken to sea on her official trial trip. The vessel is of the improved single-deck type, with full poop, long bridge amidships, topgallant forecastle, and cellular double bottom fore and aft for water ballast. She is classed 100 A1 at Lloyd's under special survey. Her dimensions are:—Length, 323 ft.; breadth, 47 ft.; and depth, moulded, 25 ft. The engines are of the triple-expansion type, having cylinders 24 in., 40 in., and 64 in. diameter, with 42 in. stroke, steam being supplied by two large steel boilers working at a pressure of 160 lbs. per square inch. On the trial the vessel was run several times

over the measured mile, and averaged a speed of 11½ knots, the machinery working very smoothly, and the trial giving every satisfaction to both builders and owners.

H.M.S. Locust.—On January 31st H.M.S. *Locust* completed her official full-power speed trials on the Clyde. Six runs on the measured mile gave the following results:—

	Steam.	Time.	Speed.
1st mile	210	1·58	30 51
2nd mile	220	1.59 2-5	30·20
3rd mile	220	1·55	31·30
4th mile	215	2·1	29·75
5th mile	212	1·56	31·03
6th mile	210	2·2	29·51

The mean speed thus realised being 30·49. The alternate runs were against the tide and wind, which increased as the trial progressed, causing a considerable sea and heavy dashing spray at time. The speed realised for the three hours continuous steaming was 30·11 knots. The Admiralty were represented by Messrs. Wisnom and J. Ball.

Bute IV.—On February 9th the smart-looking and well-equipped steel screw steamer *Bute IV.*, was put through her official trials on the measured mile at Skelmorlie. There was a strong breeze blowing from the south, and a good bit of sea coming up the channel before it, but in spite of these drawbacks she came through the trials most satisfactorily. A run against the wind and tide and another with these in her favour gave a mean speed of rather over 10½ knots, a result in excess of the guarantee. The engines were provided by Messrs. Cameron, Mills & Co., Glasgow. The vessel was built by Messrs. Fullerton & Co., Paisley, for Messrs. Hill & Co., Glasgow, to enable them to expand and improve their goods carrying trade between Glasgow, Dunoon, Rothesay, Millport, and the Arran ports.

Dunrobin.—On Thursday, February 10th, the steel screw steamer *Dunrobin*, which has been built by Messrs. Craig, Taylor & Co., Thornaby-on-Tees, to the order of Messrs. Macbeth & Gray, Glasgow, was taken to sea for her trial trip, which proved very satisfactory. The dimensions of the steamer are:—332 ft. by 46 ft. by 23 ft. 9 in., and she is of the single-deck type. The engines, which have been fitted by Messrs. Robert Stephenson & Co., Limited, Newcastle, are 22 in., 36 in. and 60 in. by 42 in. stroke, with two large boilers 160 lbs. pressure, and during the whole of the trial they worked without the slightest hitch, Mr. Gray, of the firm Messrs. Macbeth and Gray, expressing himself very highly pleased with both the ship and engines. After adjusting the compasses, the vessel proceeded to Cardiff, under the command of Captain C. M. Mackenzie.

Venetia.—On February 10th the s.s. *Venetia*, which was launched from the yard of Messrs. Short Bros., Sunderland, and built to the order of the Venetia Steamship Co., Limited, Glasgow, of which Messrs. Gow, Harrison & Co. are the managers, left the Wear on her trial trip with very satisfactory results. The vessel is of the following dimensions:—Length, 353 ft.; breadth, 45 ft.; and depth, moulded, 27 ft. 9 in.; with a deadweight carrying capacity of about 5,800 tons. She has been built of steel, under the special survey of the British Corporation and Bureau Veritas, and is constructed on the deep frame principal, thus leaving the holds clear of obstructions and utilising to the best possible advantage her large internal measurement capacity in the stowage of cargoes. The holds are four in number, fitted with double derricks at each hatchway. The steam steering gear is of the latest design and is placed at the after end of the engine platform, and having controlling rods from wheel-house on flying bridge. There is also a powerful quick-warping steam windlass, with extra large warping ends on forecastle deck. Right and left screw gear aft, and all modern improvements. The deck erections consist of full poop, long bridge amidships and topgallant forecastle. The accommodation for captain and officers, &c., is fitted in large and commodious houses on bridge deck, the saloon being handsomely fitted up in polished hardwoods, and all the berths fitted with steam heaters. The sanitary arrangements have received special attention. The seamen and firemen are comfortably berthed in a very commodious topgallant forecastle. For the purpose of trimming the vessel when light the double bottom, which is on the deep floor principal, has been subdivided into six tanks, while the after-peak is also fitted for water ballast. The propelling machinery, which has been supplied by Messrs. Thomas Richardson & Sons, Limited, of Hartlepool, consists of a set of triple-expansion engines, having cylinders 24 in., 39 in., and 66 in. diameter, and a stroke of 45 in.; two large single-ended steam boilers working at a pressure of 180 lbs. per square inch, and fitted with Howden's system of forced draught. After adjusting compasses the vessel was taken a series of runs over the measured mile, and a mean speed of 12½ knots was obtained. The vessel is in command of Captain M'Dougall. During construction the vessel and engines have been under the supervision of Mr. George M'Farlane, of Glasgow, on behalf of the owners.

Uxbridge.—On February 11th the trial trip of the steam trawler *Uxbridge*, recently launched by the Irvin Shipbuilding and Engineering Co., Limited, took place and proved highly satisfactory in every respect.

Sallust.—On Thursday, February 17th, the large cattle and cargo steamer *Sallust*, which has been built by Messrs. Sir Raylton Dixon & Co., Limited, Cleveland Dockyards, Middlesbrough, for Messrs. Lamport & Holt, of Liverpool, proceeded out to sea for her official trials under the command of Captain Hening. The vessel has been specially constructed to meet the requirements of the owners' trade to Brazil and River Plate, her principal dimensions being:—length, 367 ft.; beam, 47 ft.; depth moulded, 27 ft. 9 in., with a deadweight carrying capacity of about 5,600 tons. She is built to Lloyd's highest class, spar deck rule, with poop, bridge and forecastle. The vessel is fitted with all the latest appliances for filling and discharging the tanks, and has a complete installation of electric lighting throughout. Handsome accomodation is provided for passengers and officers in houses on bridge, and for cattlemen under the bridge. Her machinery, which has been constructed by the North-Eastern Marine Engineering Co., Limited, Wallsend-on-Tyne, consists of a set of triple-expansion engines, with cylinders 26 in., 43 in., 71 in. by 48 in. stroke, having two boilers 16 ft. by 12 ft. 6 in., working at 180 lbs. pressure. The hull and machinery have been built under the supervision of Mr. Russell, naval architect to the owners, and Mr. Morrin, their superintendent engineer, respectively. Mr. Heywood Melly, Mr. Sydney Jones and Captain Bird representing the owners. Mr. Boolds, Mr. Russell, Mr. Morrin, &c., &c., were on board during the trials, which passed off most successfully.

Caithness.—Lately the trial trip has taken place of the large new turret steamer *Caithness*, built by Messrs. W. Doxford & Sons, of Pallion, to the order of the Sutherland Steamship Co., Limited, of Newcastle. This vessel was run over the measured mile off Whitley, and attained a speed of 11 knots, which was considered highly satisfactory.

H.M.S. Gipsy.—Lately the Fairfield Shipbuilding and Engineering Co., Limited, have completed the official trials of H.M.S. *Gipsy*, the first of the 30-knot torpedo-boat destroyers built by them for the British Admiralty, with most satisfactory results. The speed on six runs over the measured mile at Skelmorlie gave a mean of 30·176 knots. On a subsequent trial of three hours' continuous steaming the mean speed was 30·207 knots.

Correspondence.

[It must be understood that, in giving insertion to communications under this heading, we do not in any way pledge ourselves to the opinions preferred therein. We will with pleasure insert any letters likely to benefit our readers, either from their intrinsic value or as being calculated to promote such discussion as will elicit facts valuable from their being the result of practical experience.—Ed. M. E.]

A NEW PADDLE-WHEEL.

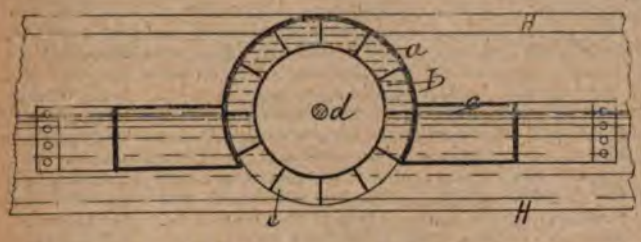
To the Editor of The Marine Engineer.

Dear Sir,—The Morgan paddle-wheel is often used for the propulsion of paddle-steamers, especially in the case of passenger steamers with high speed. The advantage of such a wheel is that it requires less power because the paddles enter the water and leave the water in an advantageous manner. It could be asked if it is possible to make a paddle-wheel with radially placed paddles so that it is as advantageous as the Morgan paddle-wheel.

Suppose, therefore, that the upper part of a paddle-wheel with radially placed paddles is covered by a cylindrical cover

and the axle of the wheel is placed as high as the water level, and suppose the inner part of the wheel is made watertight, then I suggest we may have a paddle-wheel probably as advantageous as a Morgan wheel, as shown in the accompanying sketch. H is the hull of the ship: *a* is the cylindrical cover, *b* is the wheel, *c* is the water level, *d* the axle of the wheel, *f* is the frame.

The paddles are placed radially and between two vertical plates *e*. The wheel now takes up the water and carries the water with it along the ylindrical cover *a*. Therefore the paddles neither enter the water nor leave the water, because



they always work between water particles, therefore that this wheel will be, I suggest, probably as advantageous as a Morgan wheel. Another advantage of this wheel is that it is not so heavy as a Morgan wheel, and that it is more rigid. Suppose, for example, a Morgan wheel having a diameter of 6 m. (= 20 ft.) and a breadth of 3 m. (= 10 ft.). The weight of such a wheel will be 20,000 to 30,000 kilograms, and the weight of this new wheel will be not more than half of such weight. The water which is carried with the wheel around the cylindrical cover is about as heavy as the upward buoyancy of the watertight inner cylinder of the wheel. The work done upon friction is therefore greater for a Morgan wheel than for this wheel, and the amount is perhaps for two wheels, 20 H.P. It is true that the cylindrical cover has to push away water because it is placed under the water level, but this resistance is diminished by the construction of the frame *f*. Altogether this wheel would be preferable above the Morgan wheel, and it would perhaps pay to make a trial with such a wheel. Therefore I wish to call the attention of the readers of your paper to this wheel.

Yours truly,

The Hague, Holland. X.
Feb. 16th, 1898.

[We fear that although the resistance to entry to the water of the paddles and lifting departure therefrom, is obviated in this paddle-wheel, the means of propulsion left to it is only the surface friction between the water carried round in the paddle and the outer sea, which would appear to us to be much less than the grip of an ordinary paddle-wheel; but we shall be glad to hear what our readers have to say to the suggestion.—Ed. M. E.]

"A QUICK-ACTING STOP VALVE."

To the Editor of The Marine Engineer.

Dear Sir,—Regarding the article under the above heading which appeared in your issue of the 1st of February, a copy of which we sent to the Patentees, we have received a letter from them commenting on your concluding remarks on page 416 of the same issue, in which they say: "The explosion in the *St. Paul* (nine persons killed) took place at a time when the engines were stopped, the rush of the steam did then only depend upon the size of the orifice of the break, so there might not have been a 'shocking release of pressure' compared with the release of pressure when the main engines and the auxiliary engines run full speed. Besides noting the fact that automatic valves never can be so simple in their construction as valves worked by hand, there is the advantage that the engineer can try a valve like ours and convince himself of its good working order, but he could never try an automatic valve, constructed in such a way that it only would be self-closing 'by virtue of the shock of the unretarded blow of the whole contents of the steam pipe. We are pleased to say that our valve has passed the examination of the Norwegian Government Inspectors. In Norway it is now ordained by law that every new marine steam boiler shall be provided with a quick-acting stop valve."

We remain, yours faithfully,
(For Bryan Donkin & Co., Ltd.)
Edwin B. Donkin,
Managing Director.

Southwark Park Road, Bermondsey,
London, S.E.,
February 21st, 1898.

Miscellaneous.

Advice to Boiler Attendants.—We are in receipt of a broad-sheet containing advice and warnings to boiler attendants, issued by the Manchester Steam Users' Association. We think this body are well advised to put plainly before boiler attendants simple advice as to how they are to attend to their boilers in ordinary work; to impress upon them how much may be spared to the boilers in risk as to accident by proper attention to the water level; keeping the same steady, and as to blowing off sediment and scum at the proper times and intervals. The advice as to how to get up steam with least chance of injury to the boiler plates is well worth attention. The warnings as to what to do and what to avoid when the furnaces tend to collapse, and the danger of condensed water in steam pipes when steam is admitted, should be valuable, as boiler stokers are apt to lose their heads in emergency, and are none too bright as to resources at any time.

Royal Institution.—On Friday, February 11th, a lecture was delivered at the Royal Institution by Dr. J. H. Gladstone, on the 'Metals used by the Great Nations of Antiquity," in which he traced the growth of the metal-working arts from the earliest periods of history. In connection with the occasion, a conversazione took place at the Royal Institution the same evening, which was well attended. At this a number of interesting examples of alloys and rare metals was on view, including aluminium from the British Aluminium Co., the well-known Atlas Anti-Friction metal, Delta metal, and rare metals from the firm of Messrs. Johnson, Hatthey & Co., including a specimen of uranium valued at £7,000.

The Society of Naval Architects.—The annual meeting of the Society of Naval Architects will take place as usual at the Society of Arts on the 30th of this month, and the two following days, when the Right Honorable the Earl of Hopetoun will be in the chair. The annual dinner will be given on the 30th, at the Hotel Cecil, in the Grand Hall, when a presentation will be made on behalf of the Institution to the President, the Earl of Hopetoun, to commemorate his Lordship's services to the Institution as President of the recent International Congress of Naval Architects and Marine Engineers. The secretary requests those who intend to be present to give him early notice of their intention. At a meeting of the Council it was resolved by them that they present a Gold Medal to any member or Associate of the Institution, not being a member or Associate member of the Council, who shall, at the forthcoming Spring or Summer meetings, read a paper, which, in the judgment of the Council, shall be deemed to be of exceptional merit. The Council will also be willing to present a premium of books or instruments to the reader of any paper, not being a member or Associate member of Council, which paper shall, in the judgment of the Council, merit this distinction.

The Electric Metal Working Syndicate, Limited.—We are informed that Messrs. Scott, Anderson & Beit, of Royal Insurance Buildings, Sheffield, have been appointed sole agents for the Voltex process of electric welding, brazing, &c., for the following counties:—Yorkshire (south of a line through Whitby, Northallerton and Richmond to Kirkby Stephen), together with the entire counties of Lancashire, Nottingham, Derbyshire, Staffordshire, Cheshire, Worcestershire and Warwickshire.

Institute of Marine Engineers.—The annual meeting of members of this Institute will be held on Friday, April 15th, at 7 p.m., when it is hoped there will be a full attendance to receive the annual report, and transact the business in connection therewith. The meetings on which papers will be read or discussed are on the second and fourth Monday of each month, to end of April, but taking the first Monday in April on account of Easter.

Manchester Ship Canal.—Amongst further extensions which the Manchester Ship Canal Co. are carrying out, is the erection of a large grain silo and elevator, which is being built by an American firm, the engines and boilers being supplied locally, and we are arranging to give, in a future issue, a full description, with some illustrations of this building, which is quite a novelty, as regards construction, in this country. The company are also erecting a large new warehouse at the Manchester Docks, and contracts have been given out for the general castings, which amount to 1,000 tons, to Mr. E. Wood, Ocean Ironworks, Manchester, and for the steel girders, amounting to 1,400 tons, to Messrs. Dorman, Long & Co., Middlesbrough.

Messrs. Raeburn & Verel, of Glasgow, have contracted with Messrs. C. S. Swan & Hunter, Limited, shipbuilders, Wallsend-on-Tyne, for a large steel screw steamer of about 6,000 tons deadweight, the machinery to be made by the Wallsend Slipway and Engineering Co., Limited. This vessel will embody all the latest improvements together with increased size of shafting, and the hull and machinery are to be built under the Special Survey and to take the Classification of British Corporation Registry.

The British Corporation for the Survey and Registry of Shipping.—The eighth annual meeting of the British Corporation for the Survey and Registry of Shipping was held on February 9th, in Glasgow, Mr. Nathaniel Dunlop, chairman of the general committee, presiding, and in his introductory remarks he pointed out that the Corporation had now completed the seventh year of existence, and mentioned that at the present time the vessels being built, exclusively to its class, and rule, represented an aggregate of 150,000 tons gross register which formed a very marked increase over the work of the past year, the new tonnage added to the register of the Corporation during 1897 having been also proportionate in quantity. Mr. Dunlop further remarked upon the great and important services rendered by Mr. Denny as chairman of the Technical Committee; and commenting on the work of the technical staff, he remarked that to them was largely due the growing favour with which the registry was regarded. Mr. Denny said the Technical Committee were quite prepared to consider any design, however novel, with a certainty that they were able to do justice all round.

The death occurred on February 8th, at Broomlands, Hatherton, Cheshire, of Mr. C. J. Mare, ship and bridge builder, says the *Times*. He owned shipbuilding yards at Blackwall, Millwall, and Northfleet, and constructed a large number of vessels for the British and foreign Governments, as well as for shipping companies. He was the recipient of medals from the British and Spanish Governments, and was decorated by the latter. Mr. Mare constructed the Britannia tubular bridge over the Menai Straits, the Saltash Bridge, and the Westminster Bridge.

Reviews.

Valve-Setting Record Book. By P. A. Low. London: E. & F. N. Spon, Limited.

The aids to the young engineer seem to be daily increasing. He is furnished with numerous text-books, which convey in an easy and thorough manner the experience and knowledge which has been acquired by the most able members of the profession to which he belongs. He should have no difficulty nowadays in mastering theory. Another branch of the task of rendering the young engineer efficient and thorough is that undertaken by such workers as Mr. Low. Their function is, perhaps, somewhat simpler than those of the text-book writers, but it is no less important. The designing and executing of such a form as that contained in this little book needs great thought and great experience. It is intended for use by the young draughtsman, and it gives a two-page form for each set of engines that come under his observation. The valve of each cylinder of the multiple expansion engine has a place for its own set of statistics, as have the auxiliary appliances. Every detail which needs to be known in respect of these matters can be noted in its proper place, and can be referred to at any time, after it has been noted, with the utmost expedition. Thus a vast saving of time would be effected by use of these forms, even supposing—though the supposition is a somewhat improbable one—that full notes of these matters were taken without the use of such a book. For loose and ill-arranged notes are, especially when very voluminous, almost valueless. But it is excessively unlikely that such full notes would be taken, and there would be every excuse for the noting of occasional details being omitted where no form is supplied. When such a book is used there is no excuse for anything being omitted. Not the least value of the use of these forms is the mental exercise which they give to the beginner, and the training which they afford him in habits of observation and exhaustive research, and these qualities will prove to be invaluable to him in his after life.

Aide-Memoire de l'Officier de Marine, 1898. Paris: Henri Charles, Lavderzelle.

The eleventh issue of this very careful compilation is worthy of the high reputation achieved by its predecessors. The information it contains within its limited bulk is very varied and very likely to be useful—not only to the naval officer, but also to all those who are concerned with the details of the navies of the world, and especially, of course, with that of France, a sort of navy list of French officers being afforded as well as the usual details respecting the fleet. Some useful tables for arriving at a correct estimate of distances at sea are furnished, and also tables for the comparison of weights and measures, according to English and French standards. So, too, are well chosen geometrical and trigonometrical tables, and the list of the telegraph cables of the world—so important from a military point of view—is kept well up to date. But the chief part of the book is that devoted to material of the various navies. In this expression we must include not only ships, but ordnance and torpedoes. Of the latter the various modern types now in use are discussed and described; whilst full tables as to the construction, dimensions, charge and power of the various types of guns now carried at sea are afforded. Full particulars of the ships of all Powers, small as well as great, are set out in the proper tables, and every facility will here be found to enable the student of things as they are, and may be, to arrive at a just appreciation of the position. In the lists vessels are distinguished not only according to class, but also according to employment. Thus, though H.M.S. *Northampton* appears amongst the armoured cruisers of the British Navy, a note is added to show that her employment is, at present, that of a seagoing training ship. So the American Monitor *Nantucket* is shown to be in use as a school; the Italian transport *Città di Milano* as a cable ship; whilst the stations of river gunboats and of local defence vessels are generally indicated. Amongst the fleets will be noticed three submarine boats in the French navy, two in the Russian, and no less than five in that of the United States. In our own fleet is shown the turbine ship *Turbinia*, a vessel which indeed created a great sensation at the 1897 review at Spithead, and one whose principle is by no means unlikely to be adopted by our Admiralty. Yet she is not rightly included in our fleets. This is a trifling matter, however.

The classification of the vessels is very carefully attended to, and the tables are preceded by ample descriptions of many of the most important types mentioned therein. Not the least interesting part of the book is the summary of vessels in the various fleets "building," "launched," "under trial," and "removed." It will be seen that the British Fleet is not distinguished for a large number of vessels on the stocks, whilst the French appears exceptionally prominent for its removals. Counting noses, therefore, does not quite do the strength of the French full justice, as their obsolete ships are largely excised. And our relative strength in the immediate future—owing possibly to the effects of the engineers' strike, does not promise to be fully maintained. These facts are serious enough in view of the highly charged state of the political atmosphere. We believe that war between two great maritime Powers is unlikely in the extreme. But we think that the maintenance of a full Naval strength is one of the great safeguards of peace. In this view the compilers of the "Aide-Memoire" seem to be with us. The only criticism of at all an adverse kind which can be made concerning their work is the suggestion that they over-estimate our strength and minimise their own. Under the circumstances it is natural enough. But in studying the tables of comparative Naval Powers our readers must bear this fact in mind and not feel too complacent.

The Engineer's Year-book of Engineering Formulæ, etc. By H. R Kempe. London: Crosby Lockwood & Son. 1898.

This is the fifth issue of this annual publication. In its comparatively short lifetime it has already increased one-sixth

in bulk, and possibly it may be found to have made an even greater increase in its actual value to the engineering profession, for it has not only been kept thoroughly up to date year by year, but the selection of rules and formulæ has been improved and modernised. Electricity, gas engines, and railways have had special attention in the present issue. In the department of marine engineering and shipbuilding we find very useful formulæ as to the stability and capacity of vessels of various types, and as to the efficiency and consumption of modern engines. The importance of the water-tube boiler is recognised by the attention paid to the Yarrow and Thornycroft types. The Board of Trade rules as to safety at sea in regard to the provision of efficient bulkheads, and as to the carriage of life-saving appliances are also set out. As a general handbook, too, for those engaged in various branches of engineering, the book will, as previously, be found most valuable for reference.

Recent applications for Patents connected with Marine Engineering, Ship Construction and Mechanical Appliances for use in Ships, from January 7th, 1898, to February 10th, 1898.

240 J. Gjers. Propelling and manœuvring vessels.
273 T. Dyer. Gauges for steam boilers.
296 A. E. Long. Vessel construction.
297 A. E. Long and W. Graham. Vessels.
298 J. Freeman. Steam cylinder valves.
371 W. J. Harries. Metallic packing boxes for fish.
380 J Williams. Vehicle and boat.
405 A. A. Watkins and J. de L. Watson. Indicators.
421 P. Dufray. Gauges for steam generators.
488 J. R. Coryell. Anti-friction bearings.
503 C. T. Crowden. Tube-expanders.
519 A. A. Rickaby. Piston valves of steam engines.
582 T. W. Scott. Steam engines.
630 J. Gilmour. Boilers.
648 C. Willson and T. C. Robinson. Trawl fishing.
649 F. C. Powell. Propulsion of vessels.
792 H. E Newton (C. C. Worthington, United States. Engines.
833 Sir C. S. Forbes, Bart. Metallic packing.
839 C. Calliano. Preventing sea sickness, &c.
844 H. L. Hansen. Speed-indicating device.
869 R. Ray and W. H. Johnson. Otter boards.
879 A. Clegg. Stop motions for steam engines.
889 W. Sinclair. Compositions for steam engines.
904 F. A. G. Robin and T. N. Waller. Gauge glass.
918 T. W. May and H. T. Davis. Boilers.
919 T. W. May and H. T. Davis. Boilers.
922 H. B. Graham. Internal combustion engines.
959 J. J. Royle. Steam traps.
966 A. E. Pickard and R. Mennie. Otter boards.
1004 E. Towlson and T. Andrew. Rotary engines.
1042 G. F. Coombe. Reefing mainsails.
1053 W. Philipson. Clearing stripping brush for engines.
1091 S. P. Rushworth. Connecting-rods for engines.
1092 D. McNamee. Metallic packings for stuffing boxes.
1107 A. Grabham. Silencing the valves of engines.
1136 W. S. Simpson. Hardening the surface of steel armour plates.
1146 G. Stubbs. Boiler screw.
1176 H. Horton. Metallic packings for stuffing boxes.
1231 E. H. Craig. Sea-going vessels.
1241 J. R. Smith. Otter boards for trawl fishing.
1269 G. B. Knight. Safety appliances for ships.
1336 G. W. de Tunzelmann. Propeller shaft.
1363 E. Butterworth. Internal combustion engines.
1413 C. D. Abel (J. King, C. Downes, and M. A. Iwan, Argentine Republic). Generating steam in boilers.
1438 E. E. Wigzell. Connecting-rods for engines.
1452 J. Robertson. Ships' boats.
1466 A. Bland. Piston-rod packing.
1476 R. Johnson. Propellers.
1515 L. Roper. Ships' davits.
1521 Simpson, Strickland & Co., Limited, and F. Strickland. Steam generators.
1531 P. W. Northley. Marine governors.
1558 W. W. Beaumont and H. P. Holt. Steam engines.
1560 F. L. Martineau and E. Phillips. Steam generators.
1565 H. F. Massey. Machines for forging.
1577 R. Heaton. Line guard for fishing.
1578 J. B. Senchet. Propelling screw.
1582 J. Tennant. Machinery lubricator.
1597 D. Darroch. Ships' rudders.
1638 R. E. Maile. Compass error finder.
1653 J. C. Johnson. Tubular coil steam generator.
1683 C. P. Smith. Cleaning the outside of vessels.
1700 T. Shepherd. Valves.
1717 A. F. Evans. Internal combustion engines.
1718 E. C. B. Hughes. Screw propellers.
1719 G. M. Hamlyn. Indicating the time of high water.
1728 W. Craig and H. B. Roelker. Stop valves.
1734 R. Wotton and G. B. Martin. Metallic tubing.
1751 C. H. Berry. Engine packings.
1786 A. Bitton. Boat for saving life at sea.
1792 F. J. Padbury and A. A. Garrett. Swimming device.
1830 F. W. S. Stokes. Mechanical stokers.
1852 A. E. Muir. Ballasting ships.
1855 A. Gray. Cable grip.
1888 J. Ballot. Securing bosses on shafts, &c.
1933 M. Mitchell. Valve gear of steam engines.
1962 W. Kay. Guards for ships' tables.
1991 H. Schofield and O. P. Macfarlane. Steam boilers.
2014 J. W. Hall. Internal combustion engines.
2016 E. L. Sauer and A. Coleman. Steam engine valves.
2021 P. Jensen (P. Svea, Sweden). Log-recording instrument.
2050 R. Jones. Ships' side-light lamps.
2067 C. Subaty. Boat propellers.
2072 H. Hohaus. Water gauges.
2095 E. and F. Smith. Tubular boilers.
2105 J. J. Rathbone. Rotary engine and motor.
2130 T. Coulthard, Jun., J. H. Toulmin, and W. Norris. Boilers.
2137 G. Azzeroni. Ships' propellers.
2162 H. Lowe. Steam boiler furnace.
2179 L. H. Rugg. Boilers.
2184 L. Wertheim. Insulators for steam boilers.
2217 H. H. Lake (E. Segalli, Italy). Self-closing valves.
2220 A. Craig. Oil-spraying devices for engines.
2223 W. J. Brewer. Anti-friction bearing.
2261 A. A. Good. Ocean ferry.
2271 M. D. Mangan. Steam boilers.
2274 W Nelson. Apparatus for refrigerating.
2277 H. Wormald and W. H. Scholes. Piston rings.
2278 H. Stachelhaus. Apparatus for teaching rowing.
2335 T. B. Heathorn. Boat propelling apparatus.
2352 F. C. Carter. Valves.
2367 J. H. Klencke. Lowering ships' boats.
2373 J. C. Black. Flanged joints for steam pipes.
2409 J. M. Gray. Water gauge for steam boilers.
2436 S. Clayton and H. Mensforth. Lubricating engines.
2467 F. W. Zimer. Launching boats.
2493 E. Gearing. Boiler furnaces.
2553 S. Warner and C. F. W. Perry. Composition for ships' bottoms.
2589 S. A. Ballinger. Rotary engine.
2595 N. Burgess. Exercising horses on ships.
2621 C. F. Sultmeyer. Stopping leaks in vessels.
2647 W. R. and W. Swinburn. Valves.
2648 C. B. Horrell. Coupling metallic tubes.
2653 J. Oglethorpe. Hook and rope shackle.
2654 J. W. Martin. Boilers.
2660 A. E. Long. Vessel ballasting.
2722 W. P. Thompson (T. Waage, Norway). Boiler covering.
2733 W. E. Hutchinson and A. E. Newton. Derricks.
2748 F. A. G. Robin and T. N. Waller. Water gauges.
2759 J. Butterworth. Metallic packings for piston rods.
2775 W. J. E. Binnie. Subterranean tunnels.
2789 W. T. Carter. Propellers.
2794 S. C. Norman. Driving propellers of vessels.
2807 T. H. Brough. Reducing valves.
2810 E. C. M. Chenard. Internal combustion engine.
2835 W. H. Thickett. Fishing nets.
2857 G. Witt. Oars for boat propulsion.
2858 C. W. Ross. Boilers.
2898 F. V. Beaton and F. H. Wilson. Life-buoys.
2910 H. Hamelle. Lubricators.
2916 F. W. Chapman. Cargo vessels.
2927 H. Grafton. Dredgers.
2939 F. Moorsom. Cargo vessels.

2942 J. H. Kenyon. Steam generation and consumption of smoke.
2943 J. H. Kenyon. Boiler furnace flues.
2945 W. H. Bailey. Machine for drilling flanges.
2946 F. G. Hampson and R. E. C. Shann. Tube expanding.
2947 J. Hodgkinson. Mechanical stokers.
2971 E. S. Norris. Unsinkable ship construction.
2990 A. Hunter. Low water alarms for steam generators.
2995 E. C. Blechynden, R. Y. McIntosh, and T. C. Billetop. Tubular steam boilers.
3019 W. S. Sargeant and H. Macheson. Boiler furnaces.
3032 W. Jamieson and J. Trotter. Steering torpedoes.
3044 W. S. Watson. Preserving buoyancy of vessels.
3067 E. J. Barker. Valve.
3070 A. Herschmann. Friction clutches.
3098 R. O. Allsop. Engines.
3140 H. Siller and P. Halfmann. Boilers.
3144 J. Fielding. Hydraulic valves.
3152 W. Marr. Lowering and stowing ships' boats.
3184 L. J. Todd. Stuffing boxes for machinery.
3187 G. M. Harroway. Bulkheads for cargo vessels.
3235 J. Stumpf. Valve gearing.
3255 O. Dejardin. Removing the effects of the rolling of ships.
3272 J. Pimbley. Construction of stop valves.
3275 T. M. Grant, A. Kelly, and C. D. B. Hansen. Capstans.
3278 H. R. Meyer. Indicator.
3282 E. E. Wigzell. Multiple-expansion engines.
3305 R. H. N. Lindley. Steam generators.
3320 H. B. and J. S. Watson. Steam generators.
3343 J. H. Rosenthal. Steam generators.

BOARD OF TRADE EXAMINATIONS.

Extra First Class.

January 22nd, 1898.	Bartle, G. W.	Ex.1C	London
,, ,, ,,	Dunn, J. R.	Ex.1C	Dundee
,, ,, ,,	Jones, R. A.	Ex.1C	Cardiff
,, ,, ,,	Marsden, J. H. W.	Ex.1C	London
,, ,, ,,	McGregor, W. L..	Ex.1C	North Shields
,, 29th, ,,	McLintock, R.....	Ex.1C	Glasgow
,, 22nd, ,,	Shilston, R. D....	Ex.1C	North Shields
,, ,, ,,	Storey, G.....	Ex.1C	Sunderland
,, 29th, ,,	Taylor, J. B.....	Ex.1C	Glasgow

NOTE.—1C denotes First Class; 2C, Second Class.

Jan. 15th, 1898 (*continued*).

Moir, Robert ..	1C	Liverpool
Montgomery, G.	2C	Dublin
Robe, H.	1C	London
Rodger, R. G...	2C	Leith
Ross, J.....	1C	,,
Smith, J.....	1C	Greenock
Smith, J.....	2C	,,
Tunnicliffe, L..	1C	Liverpool
Vernon, Horace	2C	,,
Young, J.... ..	1C	Greenock

January 22nd, 1898.

Atkinson, C. A.	1C	Liverpool
Bond, Henry ..	1C	,,
Davies, A.....	2C	Cardiff
Davison, R.....	1C	W.H'pool
Dixon, T. E....	1C	,,
Downs, J.....	2C	Glasgow
Gardner, W. B.	1C	W.H'pool
Harley, J.....	1C	Glasgow
Hindman, J. ..	2C	S'b'm'ton
Hutton, J. W...	1C	N.Shields
James, T.....	1C	Cardiff
Jenne, G.....	1C	,,
Kraft, J. D....	1C	N.Shields
Littlefair, G. ..	2C	W.H'pool
McConochie, J.L	1C	Cardiff
McDonald, R...	1C	N.Shields
Metcalfe, T. J..	1C	W.H'pool
Middleton, D.M.	2C	London
Miller, William	2C	Liverpool
Neal, E. T.	2C	London
Nins, L.....	2C	N.Shields
Owen, L. E.....	2C	Liverpool
Parkin, W. C...	2C	S'h'm'ton
Parrott, G. A...	2C	London
Pearson, S. T...	2C	W.H'pool
Seldon, T. F. ..	1C	Plymouth
Smith, A.....	1C	Glasgow
Smith, J. S....	2C	,,
Stein, A.	1C	W.H'pool
Stratford, J. A.	2C	,,
Taylor, A. Q. ..	2C	Glasgow
Taylor, T. M. ..	1C	,,
Tomlinson, A.C.	2C	Liverpool
Vooght, Joseph	2C	,,
Walker, Wm. J.	2C	,,
Watson, J.	1C	Glasgow
Wilkie, D.....	1C	,,
Young, Joseph	2C	Liverpool

January 29th, 1898.

Bulman, G. B..	1C	S'nd'land
Derriman, W.G.	2C	London
Duguid, R.	1C	Aberdeen
Dutton, H. G. P.	2C	London
Flockhart, P. M.	1C	Liverpool
Forster, A. R...	2C	N.Shields
Fotheringham, J	1C	Aberdeen
Gilderd, W. L..	2C	Liverpool
Goodison, F. A.	2C	Hull
Gunn, H.....	1C	London
Howe, G. W. ..	2C	S'nd'land
Jack, James....	1C	Liverpool
Johnston, T. C.	1C	,,
Mathews, S. H.	2C	,,
Merrix, A. H...	1C	London
Milne, W.....	2C	Aberdeen
Pearson, W.E.R.	2C	Hull
Raeburn, R. B.	2C	London
Robb, W.....	2C	Aberdeen
Russell, J.....	1C	,,
Sandieson, J. ..	1C	,,
Smith, T. W. ..	2C	London
Thomson, James	1C	Liverpool
Thornton, H. ..	1C	,,
Urquhart, J.M'D	1C	Aberdeen
Walker, J. R. ..	1C	Hull
Wallace, D.....	2C	L'nderry
White, R. H. ..	2C	S'nd land
Whitehead, F.W.	2C	Hull
Williamson, G..	2C	Liverpool
Wilson, Herries	1C	,,

February 5th, 1898.

Abbott, David..	1C	Cardiff
Allan, J. S. B..	2C	,,
Blackie, Gilbert	2C	Glasgow
Blight, John W.	1C	Cardiff
Campbell, A....	2C	Glasgow
Cotton, S. C....	2C	,,
Fife, James....	2C	London
Gregson, L.....	1C	Cardiff
Hadden, S. N...	1C	N.Shields
Hill, Alfred C..	2C	London
Houston, James	2C	Glasgow
Jobson, Robert	2C	London
Johnston, D. ..	2C	,,
Jones, Charles..	2C	N.Shields
Kidd, Alfred F.	2C	,,
Lees, Richard ..	2C	Glasgow
Lindsay, James	1C	London
M'Donald, Alex.	1C	Glasgow
Millons, D. U..	2C	,,
Milne, Walter J.	2C	N.Shields
Mitchell, T. S..	1C	Glasgow
Nicoll, William	1C	London
Power, William	1C	Cardiff
Priestley, David	2C	S'd'rland
Rapley, Wm. E.	2C	N.Shields
Smythe, Henry	1C	London
Stewart, Wm..	1C	Glasgow
Swanson, Wm.	2C	,,
Tait, Wm. O...	2C	,,
Taylor, A.	2C	,,
Thomas, S. J...	1C	Cardiff
Thomas, W. J..	2C	,,
Tweedy, Alex...	2C	N.Shields
Wilson, Harry..	1C	,,
Yellowlees, D...	2C	Glasgow
Young, John ..	2C	N.Shields

February 12th, 1898.

Allan, Geo.	2C	N.Shields
Allan, Hugh R.	1C	Greenock
Andersen, Peter	2C	Leith
Bamborough, J.	1C	,,
Brown, Alexr...	2C	,,
Bryers, Chas...	1C	N.Shields
Carter, S. A.	1C	Greenock
Cass, J. P.	2C	Hull
Cobb, W. S. ..	2C	Leith
Croft, W.....	1C	London
Crowley, J. F.	1C	N.Shields
Daley, D.....	2C	Liverpool
Emmerson, J...	2C	N.Shields
Guild, William	2C	Greenock
Higinbotham W.	2C	Dublin
Hogg, R. B.....	2C	N.Shields
Hooper, Thos...	2C	London
Ireland, A. H...	2C	Hull
Johnston, Wm.	2C	Greenock
Langtry, C. E.	1C	Liverpool
Lewingdon, F. L.	1C	London
Livingston, Alx.	2C	N.Shields
Macfarlane, A.	1C	Greenock
Mason, Geo. ..	2C	N.Shields
Millard, David	2C	Greenock
Moroney, E. F.	2C	London
M'Rae, Neil....	2C	Greenock
Newall, Jno. ..	2C	Liverpool
Niblock, F.....	1C	Liverpool
Nicol, Donald ..	2C	Greenock
Rainey, David L.	1C	London
Ray, H. J.	1C	Liverpool
Ritchie, Alex...	1C	Leith
Robinson, A. ..	2C	Liverpool
Small, H.....	2C	Leith
Smith, H.	2C	Hull
Spence, R.	2C	N.Shields
Thomson, D. A.	1C	Leith
Thomson, W...	1C	London
Torrance, A. J.	2C	N.Shields
Williams, A. B.	1C	London

February 19th, 1898.

Agar, Wm.	2C	W.H'pool
Allan, G. F. ..	2C	,,
Allsup, W. A...	2C	Liverpool
Ashburner, G.P.	1C	,,
Barclay, J. E...	1C	Dundee
Bell, J. H.	1C	Cardiff
Bowden, J.	1C	Dundee
Brownlee, G. J.	1C	W.H'pool
Brownson, C. ..	1C	Liverpool
Cockle, A.	2C	London
Crammond, A.	2C	N.Shields
Drysdale, W. A.	1C	Liverpool
English, W. R.	2C	N.Shields
Evans, V. W...	2C	London
Falconer, J.....	2C	,,
Feely, J.	2C	Glasgow
Fernie, D. M. ..	2C	Dundee
Frank, John ..	2C	W.H'pool
Fraser, W.	2C	Glasgow
Gibb, E.	1C	N.Shields
Green, Thomas	2C	Glasgow
Harkness, R. ..	2C	W.H'pool
Harrison, T. ..	2C	N.Shields
Hendry, H. S.	2C	Glasgow
Henry, E.	2C	N.Shields
Hill, James....	1C	,,
Irvin, G. W. ..	1C	,,
Jensen, S.	2C	,,
Johns, W.	2C	Cardiff
Johnston, T. L.	2C	Glasgow
Hendrick, W. R.	2C	London
Langley, J. H.	2C	N.Shields
Le Crew, W. J.	1C	London
Macdonald, R.M	2C	Glasgow
Malpas, E. S. ..	2C	London
Marshall, D. M.	2C	Glasgow
Millington, A...	2C	Liverpool
Milne, C.....	2C	London
M'Naughton T.S	2C	Dundee
M'Pherson, C.A.	2C	Glasgow
M'Tear, J. W.	2C	,,
Muir, J. L.	1C	,,
Munro, C.	1C	,,
Murray, A.....	2C	N.Shields
Naismith, G...	2C	Glasgow
Noble, C.....	2C	W.H'pool
O'Doherty, T. R.	2C	N.Shields
Picken, John ..	2C	W.H'pool
Riding, John ..	1C	Liverpool
Robinson, Frank	1C	W.H'pool
Robson, W.....	1C	,,
Rough, A. J. ..	2C	Glasgow
Rudledge, W. H.	2C	Cardiff
Scott, R.	1C	Glasgow
Scott, T.	1C	Dundee
Shepherd, A. W.	1C	Cardiff
Simmonds, A.	1C	London
Simpson, A. B.	1C	W.H'pool
Sonne, J.....	1C	,,
Sweeting, T. ..	2C	,,
Taylor, J.	2C	Glasgow
Thornburn, J...	1C	Liverpool
Valentine, E. ..	2C	W.H'pool
Valler, C. H. ..	1C	London
Wallace, J.	1C	Glasgow
Watt, J. J.	2C	W.H'pool

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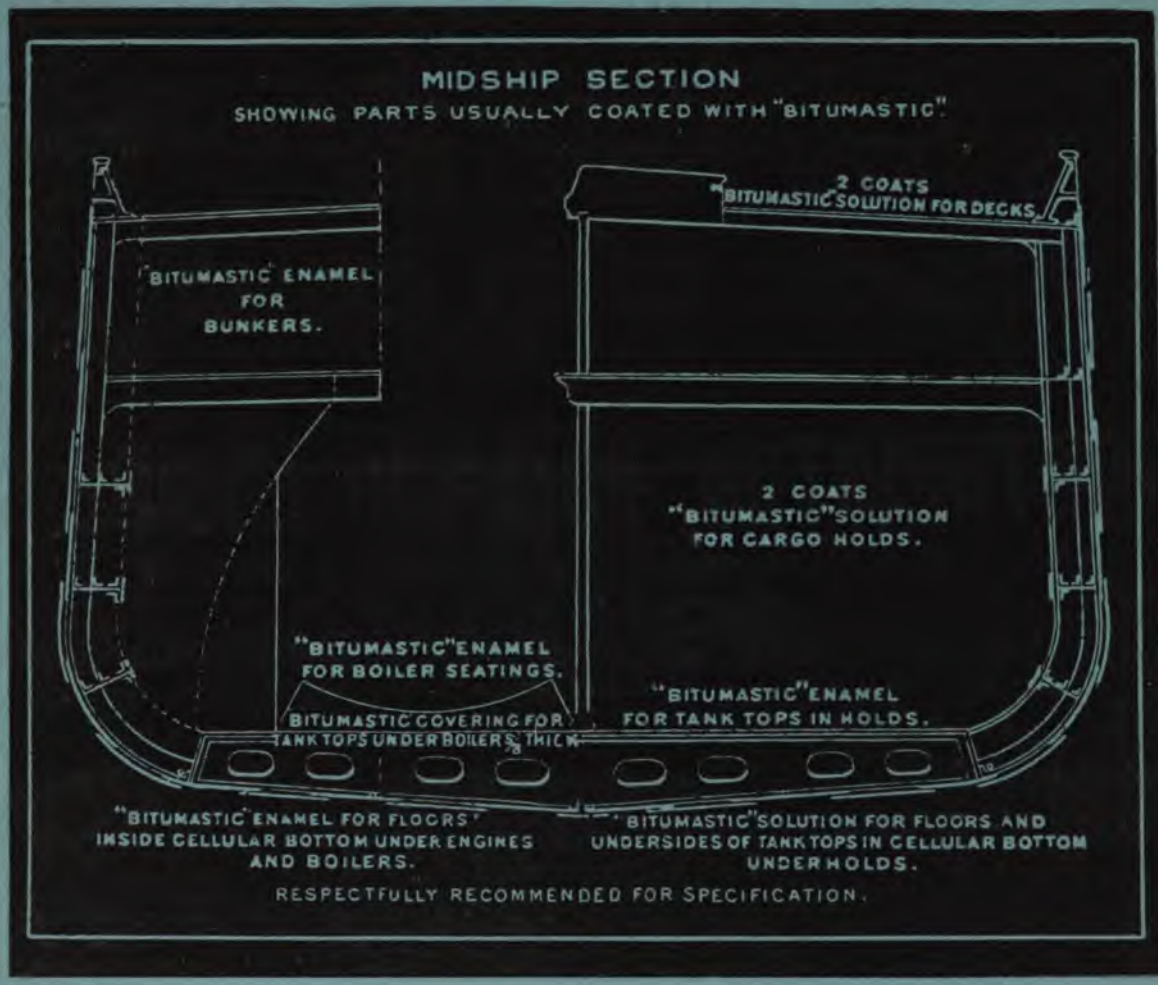
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